Regional Municipality of Durham

Bid Opportunity: T-1160-2021 – Construction of New Seaton Paramedic Station and Training Facility in the City of Pickering

Closing Date: Thursday, December 16, 2021; 2:00 PM

Addendum Number 02 – December 3, 2021

This addendum will form a part of the bid documents for the above-noted bid and shall be read in conjunction therewith. This addendum will take precedence over all requirements of the original bid documents and any addenda issued previously.

Bidders shall acknowledge receipt of this addendum with their electronic bid submission on the declaration page in the bidding system.

Attachments

1. Hydrogeological report titled “Hydrogeological Assessment, Thompson’s Corner Phase 1A Lands”, by R.J. Burnside & Associates Limited, dated November 2019, and consisting of 130 pages.
2. Memorandum Titled “Water Level Measurements, Northwest Corner of Concession Road 5 and Sideline 16, Pickering, ON.”, by EXP, dated April 1, 2021, and consisting of 2 pages.
3. Operable Partitions - Manufacturer’s Shop Drawings titled “OP-01_Drawings”, consisting of 6 pages.
4. Stainless Steel Sink - Manufacturer’s Shop Drawings titled “RFDS-96-2B SS Sink Cutsheet”, consisting of 1 page.

Appendix D1 – Deliverables

Specifications

1. Section 10 22 26 Operable Partitions, Paragraph 2.2.11.; Delete in its entirety.

2. Section 10 22 26 Operable Partitions, Paragraph 2.2.12.; Delete in its entirety, and replace with the following:

   .12 Pocket Door:

      .1 Basis of design: Type III Pocket Door by Modernfold, or approved alternate.

      .2 Finish to match panel.

3. Section 22 42 00 Plumbing Fixtures, Item 2.6.2.; Revise the following paragraph to read as follows:

   .2 Designation (S-2)

      1. Built-in Two Compartment Stainless Steel Sink/Table
      2. Faucet: Chicago Faucets 640-GN1AE35-317YAB, or approved alternate, Wall mounted two handles Manuel Faucet, Chrome plated finish, ECAST construction lead free (equal or less than 0.25%) solid brass exposed body, hot and cold water connection, wall-mounted with adjustable arms for 6-1/4"- 9-3/4". 4" metal, vandal-proof, wrist-blade handles with sixteen-point, tapered broach and secured blue and red index buttons, rigid/swing gooseneck spout, 3-1/2" center-to-center, 1.5 GPM (5.7 L/min) pressure compensating Softflo aerator, ceramic quarter-turn cartridge, features square, tapered stem, 7/8" offset inlet supply arm with 1/2" NPT female thread inlet, 2-5/16" diameter slip flange, integral stop valves for servicing the faucet, meets ADA ANSI/ICC A117.1 requirements and tested and certified ASME A112.18.1/CSA B125.1, and Certified to NSF/ANSI 61, Section 9 by CSA.
      3. Thermostatic Mixing Valve: Lawler no. TMM-1070 or approved alternate, below deck mechanical water mixing valve, bronze body, temperature adjusting dial, 10mm (3/8") inlets and outlet compression fittings, high temperature thermostatic limit stop, shut-off with automatic reset when temperature exceeds 120ºF (48.8ºC), integral checks, offer temperature range from full cold through 46°C (114.8°F). Provide tee, adaptors and flexible copper tubing to suit installation.

4. Supplies: McGuire no. LFH165LKN3 faucet supplies or approved alternate, chrome plated finish polished brass, heavy duty angle stops, 10 mm (3/8") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, V.P. Loose keys, Escutcheon and flexible copper risers.
5. Trap: McGuire no. 8912CB P-Trap or approved alternate, heavy cast brass adjustable body, with slip nut, 38mm (1-1/2") size, box flange and seamless tubular wall bend.

Appendix D2 – Deliverables

Drawings

Architectural

1. Drawing 9/A-920 Interior Elevation and Millwork MW003; Change length of millwork from (3) 1,219mm base cabinet sections to (3) 1,000mm. Overall length shall be 3,000mm. Centre millwork on wall, between doors.

Questions and Answers

Question 1:

Request for Alternate Aluminum Plank Panels - Section 07 46 17, 2 Products, 2.2 - proposed alternate. DIZAL 4 inch v groove aluminum planks. More information available here: https://www.dizal.com/products/aluminum/planks/

Answer 1:

The provided information regarding a request for alternate does not follow the guidelines indicated in the Project Manual. Please refer to Document 1 of 4 (Information for Bidders), 1.7 Equivalent Products for procedure of submitting for consideration of equivalent or equal products to the make/model specified.

Question 2:

Request for alternate louvre acceptance - section 08 90 00 - 2.2 fixed louvre systems. alternate requested - model D2403 2 inch drainable by ten plus architectural as alternate to model E2DS by architectural lourvres co.

Answer 2:

The provided information regarding a request for alternate does not follow the guidelines indicated in the Project Manual. Please refer to Document 1 of 4 (Information for Bidders), 1.7 Equivalent Products for procedure of submitting for consideration of equivalent or equal products to the make/model specified.

Question 3:

Regarding stainless steel can you please clarify the following: How Long is the Stainless Steel Small Tank Rack? Exact length not shown on drawings.

Answer 3:

The small oxygen tanks are MD size (4.38 inch or 111.3 mm diameter each). Therefore, the length of the small tank rack shall be approximately 1,200 mm (48 inches).

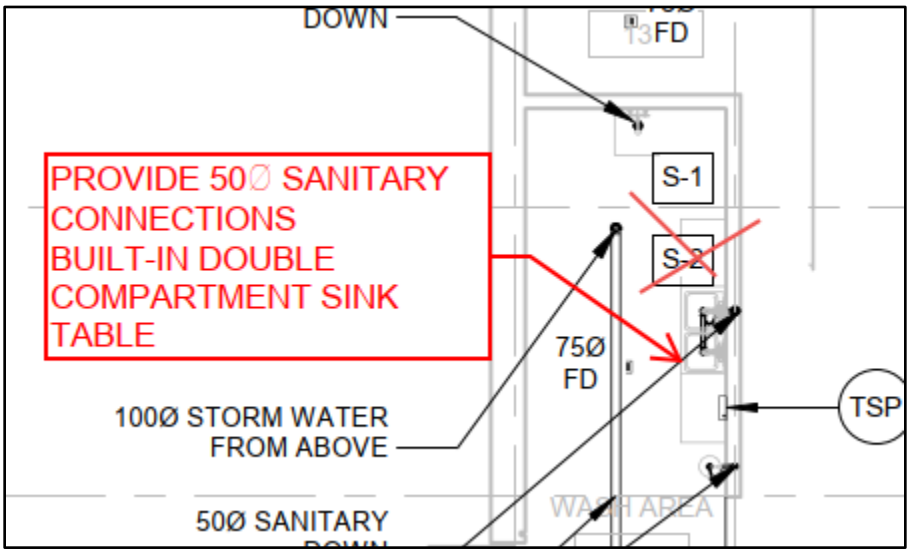
Question 4:

Regarding stainless steel can you please clarify the following: Where is all the Stainless Steel Casework shown on the drawings (Specification section 12 31 00), is there a detail on cabinet height, width, depth? (drawer or shelf details are important as well)

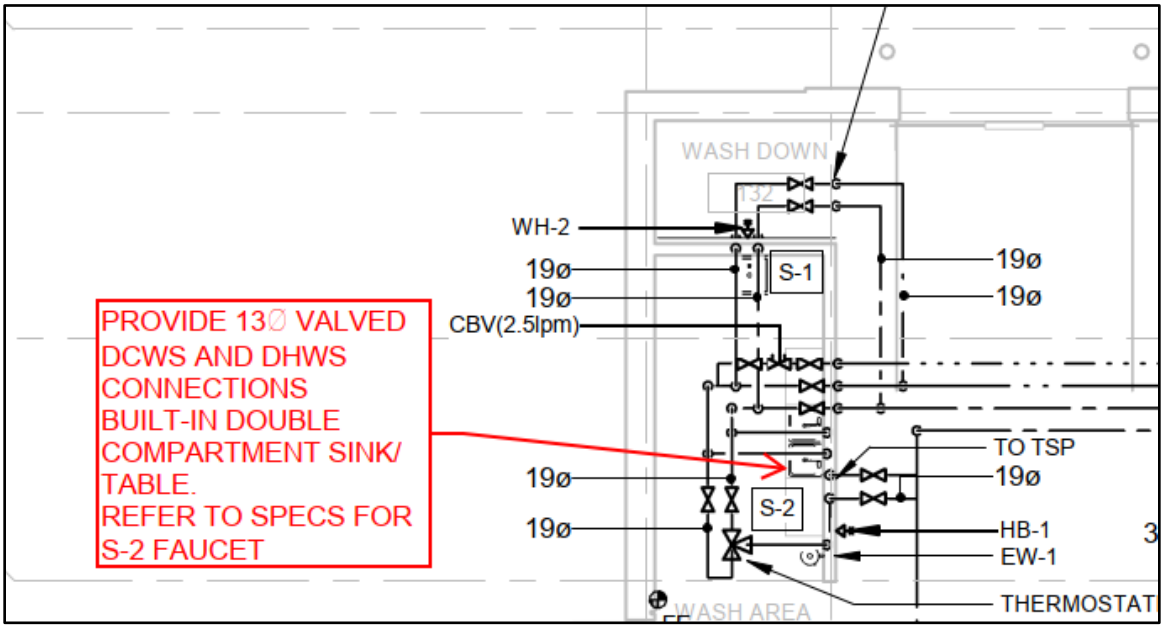
Answer 4:

Please provide scullery sink RFDS-96-2B by Interdyne Systems Inc., or approved equal. Holes for plumbing to be coordinated with supplier during Submittals. See Partial Plan revisions below.

Addition of a Stainless-steel countertop cut sheet appended to Section 22 42 00 Plumbing Fixtures and attached to this Addendum 02.



M-101: Partial Floor Plan - Drainage



M-200: Partial Floor Plan - Plumbing

Question 5:

Regarding stainless steel can you please clarify the following: Are counters Stainless Steel or different material?

Answer 5:

Please see Section 22 42 00 Plumbing Fixtures, and the revisions of that Section, identified in this Addendum 02.

Question 6:

Regarding the operable partition please clarify the following: Section 10 22 26 2.2 Horizontal operable partition 10 Panel finishes: .1 Panel Facing: Refer to Schedule of Finishes. Section 09 06 00 Finishes schedule does not contain details on the finish for Section 10 22 26.

Answer 6:

Finish shall be selected by Architect from Standard Vinyl Offering by koroseal, heavy-duty, offered by Modernfold (or approved alternate). Panel Facing finish shall comply with 10 22 26, paragraph 2.3.1.

Question 7:

Regarding the operable partition please clarify the following: Section 10 22 26 2.2 Horizontal operable partition .11 Pass door: .1 Locate where shown on the plans...A pass door is not shown on the plans. Is a pass door required? And where is it to be located?

Answer 7:

Pass door is not required. Please see Section 10 22 26 Operable Partitions revisions above, as identified in this Addendum 02.

Question 8:

Regarding the operable partition please clarify the following: A-201 reflects the paired panel operable partition with a stoage pocket. The dimensions for the pocket both width and depth are too small to accommodate the partition specified. Please advise.

Answer 8:

Please provide 13-panels, Type III pocket door. Pocket width 1,676mm (as shown on A-201) should be sufficient to achieve 1,422mm inside-pocket clearance by constructing the pocket walls with GP92 partitions. Pocket depth shall be increased to 1,854mm.

Addition of manufacturer’s Shop Drawings are appended to Section 10 22 26 and attached to this Addendum 02.

Question 9:

Regarding the operable partition please clarify the following: Section 10 22 26 2.2 Horizontal operable partition .12 Pocket Door: Unequal half, bi-folding pocket door. .1 Basis of design: Type IV B pocket door by Modernfold Inc. This type of pocket door will not work with the specified partition. A Type III Double Unit w/Hinged Center Unit is required. Please advise.

Answer 9:

Please see answer to Question 8 above. Please see Section 10 22 26 Operable Partitions revisions above, as identified in this Addendum 02.

Pocket Door configuration shall be manually operated: Type III double doors hinged to a jamb on each side and closing in the center. One of the door panels is equipped with a smaller hinged panel that folds back when the operable partition is extended into the pocket.

Question 10:

Please advise as to when the projected start date and completion date will be for this project?

Answer 10:

Please refer to Appendix B – Supplementary Conditions (SC) to Stipulated Price Contract CCDC 2-2008, Article A-1 – The Work, for anticipated Order to Commence Work and Substantial Performance dates. As communicated during the Pre-Bid Virtual Meeting, it is the desire of the Region to Award the Contract earlier than the Order to Commence Work date so that the Contractor can proceed with Pre-Construction Meeting, Submittals, Mobilization, Erosion Control, and ordering materials with long-lead times.

Question 11:

Please advise on operable wall panel finish (not found in Finishes schedule).

Answer 11:

Please see answer to Question 6 above.

Question 12:

Can you please provide a Hydrogeological Report?

Answer 12:

Hydrogeological Assessment, Thompson’s Corner Phase 1A Lands (November 2019), by RJ Burnside is appended to Section 00 31 00 Available Project Information and is attached to this Addendum 02.

In addition, Water Level Measurements memo, Northwest Corner of Concession Road 5 and Sideline 16 (April 1, 2021) by EXP is appended to Section 00 31 00 Available Project Information and is attached to this Addendum 02. The EXP memo is to be read in-conjunction to their geotechnical report (November 26, 2018).

Question 13:

Can you please confirm all tree's will be removed prior to construction as per 7.1 in the Geotech Report?

Answer 13:

All trees planted by Dutchmaster Nurseries have already been removed from the site.

Question 14:

Per Geotech report 7.3.6, please confirm that all perimeter walls should be backfilled with free draining granular material?

Answer 14:

Geotechnical design behind subsurface walls shall be per recommendations by the geotechnical engineer, engaged by Owner.

Question 15:

Please confirm that the material labelled as fill is suitable to support the paving asphalt, or if the fill needs to be removed from underneath the asphalt similarly to what's required for the building.

Answer 15:

Refer to Soil Management Plan by EXP (August 31, 2021) included in Project Manual – Volume 1; Appended to Section 00 31 00 Available Project Information.

Question 16:

Metal casework (specification section 12 31 00) is not found on the drawings. Please provide location, elevations, details.

Answer 16:

Please see answer to question 4 above.

Question 17:

Please advise on operable wall panel finish (not found in Finishes schedule).

Answer 17:

Please see answer to Question 6 above.

Question 18:

Please consider Uniq-wall Ltd. operable wall systems as an alternate for 10 22 26 - Operable Wall System.

Answer 18:

The provided information regarding a request for alternate does not follow the guidelines indicated in the Project Manual. Please refer to Document 1 of 4 (Information for Bidders), 1.7 Equivalent Products for procedure of submitting for consideration of equivalent or equal products to the make/model specified.

End of Addendum 02

Hydrogeological Assessment, Thompson's Corner Phase 1A Lands

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November 2019
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Distribution List

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Record of Revisions

Revision	Date	Description
-	November 11, 2019	Final Submission

R.J. Burnside & Associates Limited

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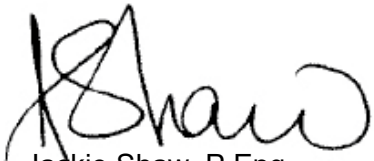

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by Seaton TFMP Inc. (c/o Mattamy Development Corp.) to complete a hydrogeological study for the Thompson's Corner lands located in Pickering, Ontario. The Thompson's Corner lands are loosely divided into quadrants correlating to Phases 1A, 1B, 2A and 2B. The Phase 1A area is the subject property for this report and is located approximately 700 m east of the intersection of Brock Road and Concession 5 Road in Pickering (part of Lot 17, Concession 4). The boundaries of the subject property are shown on Figure 1.

1.1 Background

As part of the Master Environmental Servicing Plan (MESP) studies for the Seaton area (Sernas et al., 2008, 2010), extensive monitoring and hydrogeological studies to characterize the physical setting, geology, hydrogeology, wetland and surface water flow conditions were completed, along with detailed modeling of the surface water, groundwater and water balance conditions. An amendment to the MESP was completed addressing agency comments and providing additional monitoring data and more comprehensive surface water and groundwater flow modelling for the area (MESPA, GHD et al., July 2013).

The stormwater management plans recommended in the MESPA for the Seaton area included the use of Low Impact Development (LID) measures intended to maintain the water balance to the natural features and functions, and to promote infiltration to reduce stormwater runoff volumes and maintain groundwater recharge where possible.

In 2013, Burnside completed the hydrogeological component of the Neighbourhood Functional Servicing and Stormwater Report (NFSSR) for the Seaton Neighbourhood 20 lands, which include the subject property. The purpose of the Neighbourhood hydrogeology study was to provide further detail on the area-specific soil and groundwater conditions, and to identify opportunities and constraints for infiltration as input to the FSSR for appropriate location and design of LID measures.

Development plans for the Phase 1A lands are moving forward, and Urbantech Consulting (Urbantech) is preparing the necessary engineering and stormwater management reports for the subject property. We understand that the TRCA has requested more information on the shallow soil and groundwater conditions, specifically with respect to the proposed LID strategy. Burnside has been asked to review soil and groundwater data collected since the submission of the NFSSR, provide further detail on the site-specific soil and groundwater conditions across the Phase 1A lands and to comment on the suitability of these conditions for infiltration at potential LID locations. The results are the subject of this Phase 1A Hydrogeological Assessment report.

1.2 Scope of Work

The scope of work of this hydrogeological assessment involved a compilation and review of published geological and hydrogeological information from government mapping, and the MESP, MESPA and NFSSR work completed for the Neighbourhood 20 lands, as well as the review of more recent site-specific investigations for the Phase 1A lands and monitoring as described below:

1. Review of water well records: The Ministry of the Environment, Conservation and Parks (MECP) well records database provides geological records of water supply wells drilled in Ontario. A summary of the local well records within 1000 m of the subject property is provided in Appendix A. It should be noted that well locations provided by the records are approximations only and may not be representative of the precise well locations.

2. Review of site-specific soils data: Since the submission of the NFSSR in 2013, additional site-specific borehole data has been collected during geotechnical investigations conducted in 2016/2017 by Sirati and Partners Consulting Ltd. (Sirati) and in 2018/2019 by Shad and Associates Inc. (Shad). The investigations included the advancement of boreholes at 18 locations between October 2016 and July 2019 to depths of up to approximately 9.6 m below ground (mbg). Previous boreholes were drilled at 2 locations by Golder Associates Ltd. (Golder) in May 2011. The borehole locations are shown on Figure 5 and the borehole logs are provided in Appendix B.

   Grainsize analysis were also completed on 10 representative soil samples collected during the drilling operations and the resulting particle size distribution plots are provided in Appendix C. These data are used to quantify the surficial sediments and estimate the hydraulic conductivities of the soils encountered.

3. Installation of groundwater monitoring wells: A total of 15 monitoring wells have been installed across and adjacent to the subject property as part of the various borehole drilling programs and the well construction details are shown on the correlating borehole logs in Appendix B. The well locations are shown on Figure 4.

4. Installation of drive-point piezometers: A total of 2 piezometer nests (each consisting of two separate pipes adjacent to one another, but driven to different depths) were installed in the nearby wetland feature known as Wetland U9. Piezometer nest WPZ-U-09-1s/d was installed in May 2009 and nest WPZ-U-09-2s/d was installed in September 2019 to assess the shallow groundwater conditions, measure vertical hydraulic gradients and assess the potential groundwater/surface water interaction. The piezometer locations are shown on Figure 4.

5. Groundwater monitoring: Measurements of the depth to the water table at monitoring wells and piezometers to assess horizontal and vertical groundwater flow conditions began in 2011 at MW11-7-1, MW11-7-2s/d, and WPZ-U-09-1s/d. This monitoring was conducted on a monthly basis by SPL Consulting Limited (SPL) and ceased in December 2012. Burnside began monitoring at all current locations in August 2019 and weekly measurements were obtained through September. Monitoring continues monthly. Automatic Water Level Recorders (AWLRs or dataloggers) were installed on September 27, 2019 in BH115 and BH30-5-A to capture continuous water level information and fluctuations. A continuous barometric pressure datalogger was also installed to accurately compensate for variations in air pressure. The groundwater level monitoring data are summarized in Table D-1 and hydrographs (Figures D-1 to D-11) are provided in Appendix D.

6. Surface water monitoring: A surface water spot flow monitoring station was established on the Urfe Creek tributary that flows west of the subject property and through Wetland U9 (SS-U9 on Figure 4). The station is on the discharge side of the culvert that transmits the flow beneath Concession 5 Road to assess surface water inputs to Wetland U9, and has been monitored on the same frequency as the groundwater monitoring program described above.

7. Hydraulic conductivity testing: Single well response tests (slug tests) were completed by Shad (2019) at BH113 and BH117 to assess in situ hydraulic conductivity of the surficial soils. Similar tests were also completed by Burnside across the overall Neighbourhood 20 lands at 6 locations in May 2011, and although none of these tests were within the subject property, the results can provide insight on the properties of the same soil deposits encountered across the subject property. The test results are provided in Appendix E.

8. Infiltration testing: Double-ring infiltrometer tests were completed across the overall Neighbourhood 20 lands at 7 locations by Burnside in May 2011 to assess in situ infiltration rates of surficial sediments. One location, identified as N20-IF6, is in the southeast area of the subject property and is shown on Figure 4. The test results are provided in Appendix E.

2.0 Topography and Drainage

Topography across the subject property is relatively flat to rolling with an overall slope from south to north (Figure 2). Mapping suggests that the topography ranges in elevation between approximately 167 m above sea level (masl) in the southwest corner of the property and 152 masl in the northwest corner, providing a total relief amplitude of approximately 15 m. From the west development boundary, the topography slopes downwards to approximately 144 masl in the Urfe Creek tributary valley (Figure 2).

A topographic ridge that is generally oriented from north to south down the middle of the subject property divides overland drainage to two subwatersheds. The west and southern portions of the property are within the Urfe Creek subwatershed while an eastern portion is within the Upper Duffins Creek subwatershed. A small portion of the northwest corner of the subject property drains to the northeast, to the Brougham Creek subwatershed. All three subwatersheds reside in the overall West Duffins Creek watershed. The confluence of the Urfe and Brougham Creeks with the West Duffins Creek (via the Ganatsekiagon Creek) is approximately 4.5 km south of the subject property.

2.1 Wetland U9

Wetland areas across the Seaton lands have been identified by the Ministry of Natural Resources and Forestry (MNRF) and TRCA, and most are located within the land areas designated as Natural Heritage System (NHS). Each have been described in detail in the final MESPA document (2013) as well as the NFSSR (2013) and were given wetland identification labels to reflect the subwatershed in which the wetland is located (e.g., U is for Urfe Creek). Wetland U9 is located west of the subject property (Figure 2), adjacent to the proposed stormwater management facility (SWMF). Wetland U9 is comprised of sandy soils over till deposits as described in the MESPA (2013) document.

The MESPA (2013) document assessed U9 as a Category D wetland, meaning that the wetland has catchment areas located within or partially within the proposed urban development areas and an assessment of the water balance conditions would be required. The NFSSR (2013) concluded that water conditions in the wetland were characterized to predominantly rely on surface water inputs, with no perennial open water observed. Feature-based water balance modelling conducted as part of the NFSSR (2013) in response to the MESPA recommendations concluded that the decrease in drainage area will not negatively impact the wetland due to the increase in runoff associated with the development's SWMF, and that no mitigation measures would be required.

2.2 Surface Water Monitoring

A surface water flow monitoring station was established for this study at one location on the Urfe Creek tributary associated with Wetland U9 at the discharge side of the culvert that transmits the tributary flow beneath Concession 5 Road (SS-U9 on Figure 4). Monitoring of the surface water flows began on August 30, 2019 during a comprehensive site walk of Wetland U9 and again on September 11 and September 27, 2019. Flow conditions on all occasions were observed to be dry (i.e., no flow into the wetland). In addition, the surficial soil conditions within the wetland were observed to be dry. These findings agree with the MESPA and NFSSR conclusions that the wetland relies predominantly on surface water inputs.

2.3 Groundwater/Surface Water Interaction

Piezometer nest WPZ-U-09-1s/d was installed as part of the previous studies in May 2009 and is located approximately 250 m south of Concession 5 Road within Wetland U9 (Figure 4). The water level data collected and summarized in the NFSSR indicated seasonal vertical gradient reversals at this location. The water level in the deeper piezometer was slightly higher (up to 30 cm) than the shallower piezometer in the spring of 2011, indicating an upwards gradient and discharge conditions. However, the shallow piezometer was found to be dry throughout the summer of 2011 and 2012 and the depth to groundwater was typically found to be more than 60 cm below ground surface at this location. It was concluded that the discharge gradients may not result in actual water seepage into the wetland, but support the high water table and root zone for wetland vegetation. Seasonally upwards gradients may also support the wetland conditions by limiting the downward recharge of surface water from the feature. The water level data are shown on Figure D-10, Appendix D.

Piezometer nest WPZ-U-09-2s/d was installed on September 10, 2019 and is located approximately 20 m south of Concession 5 Road within Wetland U9 (Figure 4). Initial monitoring data collected at this piezometer nest shows that the water level in the shallow piezometer was higher than the water level in the deep piezometer by 41 cm, indicating a downward gradient and recharge conditions. Observations made during installation also indicated dry ground conditions. The water level data are shown on Figure D-11, Appendix D. The new data agrees with the findings of the previous studies that Wetland U9 relies on surface water inputs. A high water table in this area supports the root zone for wetland vegetation while simultaneously limiting downward recharge of surface water from the feature.

3.0 Geology

3.1 Surficial Geology

Surficial geology mapping published by the Ontario Geological Survey (OGS, 2003) shows that the subject property is covered entirely by Halton Till, which comprises sandy silt glacially-derived till deposits. Sandy silt to silty sand till deposits, identified as Newmarket Till, have been mapped to the west of the subject property and coarse grained glaciolacustrine deposits of sands and gravels are mapped east and south of the subject property (Figure 3).

The results of the various drilling programs generally agree with the mapping. The borehole logs (Appendix B) suggest that a thin veneer of topsoil blankets the site and is generally 0.3 m to 0.4 m thick, but is as much as 1.4 m thick in some areas. In the southern extents, the topsoil is underlain directly by a thick deposit of silty sand to sandy silt till (interpreted to be Newmarket till) and is in excess of 9.6 m thick in areas (Borehole G7-1-A). Shad (2019) describes this deposit as partially cohesive, with some

to trace clays frequently observed. The shallower tills become increasingly fine-textured moving north and west within the subject property, with clayey silt tills (interpreted to be Halton till) ranging in thickness from 0.7 m to 1.9 m observed within 3 m of surface in BH113, BH114, BH116, BH30-6, BH30-8, BH30-10 and SR10. The finer clayey tills appear to span the entire depth of the borehole at MW11-7-2s/d (9.6 m), although adjacent BH117 describes this deposit as more coarse-textured (Appendix B).

At maximum investigative depths of 9.6 m, almost all of the boreholes were advanced to the Halton or Newmarket till deposits as described above. Few boreholes extended into the underlying Thorncliffe Formation or beyond. It is interpreted that borehole SR11 encountered the Thorncliffe at 7.7 m (approximately 147 masl), characterized as a thick sand and gravel deposit, and a localized high point of the Thorncliffe may be present in this area. It is interpreted that BH113 also encountered the Thorncliffe at depth 5.6 m (approximately 142 masl) where sand deposit was observed, and artesian conditions were encountered. It is noted that lands immediately to the east and northeast of the subject property, known as the TRCA Brock Lands North and South (of Concession 5 Road, respectively) previously operated as sand and gravel extraction pits beginning in the 1950s and shows the extensiveness of the deeper sand and gravel deposits in the area.

Occasional non-cohesive deposits in the shallower sediments were also observed in boreholes SR10 (2.3 m of fine sand at depth 2.3 m), and BH30-1 (0.8-m of silty sand at depth 4.0 m). It is interpreted that these are the interstadial deposits and are likely thin and laterally discontinuous over the subject property. These local deposits may also contribute to perched aquifer conditions as they overly clayey silt tills in areas.

3.2 Bedrock Geology

The regional mapping suggests that the bedrock in the area is shale and minor limestones of the Georgian Bay Formation (Upper Ordovician Age). The shales were not encountered in any of the boreholes advanced on the subject property, nor in nearby MECP water wells. The YPDT-CAMC mapping suggests that the bedrock generally slopes downwards from northwest (elevation 90 masl) to southeast (elevation 75 masl) towards a local bedrock depression of 35 masl approximately 600 m southeast of the subject property, near Church Street North. It is therefore interpreted that the total depth of overburden at the site ranges from approximately 62 m to 82 m.

3.3 Hydrostratigraphy

The hydrostratigraphy in the area of the subject property is well documented and the major aquifer units present are summarized as the following from high to low elevation:

- Oak Ridges Aquifer Complex (ORAC) – interconnected deposits formed within the surficial sediments and between the surficial tills (i.e., Mackinaw Interstadial Deposits). These are laterally discontinuous over the subject property.

- Thorncliffe Aquifer Complex (TAC) – sandy and gravelly sediments associated with the Thorncliffe Formation and generally separated from the overlying ORAC by the Newmarket till aquitard (sandy silt tills).

- Scarborough Aquifer Complex (SAC) – sandy sediments of the Scarborough Formation overlying the bedrock and separated from the TAC by the Sunnybrook aquitard in this area.

To illustrate the local subsurface conditions, schematic cross-sections through the subject property have been constructed using the results of the geotechnical investigations and previous findings. The alignments are shown on Figure 5 and the cross-sections themselves are shown as Figure 6 and 7. On the cross-sections, an interpretation of the major hydrostratigraphic units (i.e., main aquifers and aquitards) has been made based on the overall sediment characteristics.

The ORAC is not encountered in the vicinity of the subject property and appears to pinch out north of the study area. An extensive sand unit is encountered between elevations 140 masl and 150 masl beneath the subject property which is interpreted to be the TAC (Figures 6 and 7). The TAC is overlain by approximately 5 m to 10 m of predominantly silty sand and sandy silt till, interpreted to be the Newmarket and Halton Till deposits.

3.4 Soil Hydraulic Conductivity

There are various methods that can be used to assess soil hydraulic conductivity, i.e., the ability of the soil to transmit groundwater. Grainsize data and soil characteristics can be utilized to provide a general estimate of hydraulic conductivity. Single well response tests, such as bail-down and slug tests, are used in groundwater monitoring wells to assess in situ hydraulic conductivity of the soils represented across the screened interval of the well. These k values are represented as "k_{sat}" as they are derived from below the water table under saturated conditions.

The estimated hydraulic conductivity values may then be used to estimate infiltration rates based on approximate relationships. It is also possible to directly assess soil infiltration rates at surface using infiltrometer tests. A safety factor may then be applied to the infiltration rate to provide a design infiltration rate. All of these methods have been

used to estimate the hydraulic conductivity of the shallow soils on the subject property and the findings are discussed below.

3.4.1 Estimates from Soil Grainsize Analysis

During the geotechnical investigations completed by Shad (2018 and 2019), a total of 25 representative soil samples were collected and submitted for laboratory analysis for grainsize distribution (Appendix C). The results of the grainsize analysis were assessed using the Hazen estimation (D_{10}) to evaluate the hydraulic conductivity of the sediments. It is acknowledged that the Hazen estimation method is designed to approximate the hydraulic conductivity of permeable sediments, however in practice, it is still a useful consideration to evaluate the grainsize curves for a general indication of the range of hydraulic conductivity values.

Of the 25 grainsize curves assessed, only 8 had viable D_{10} values (minimum particle size of 1 µm as shown in the distribution curves) in which a hydraulic conductivity value could be derived using the Hazen estimation. The remaining 17 samples were too fine-grained (D_{10} < 1 µm) and the correlating hydraulic conductivities of these samples is interpreted to be <1.0 x 10^{-6} cm/sec (i.e., in the range of 10^{-7} cm/sec). The results of the assessment are summarized in Table 1.

Table 1: Estimated Hydraulic Conductivity (k) from Grainsize Analysis

Borehole	Sample No.	Soil Description	Sample Depth (m)	k (cm/sec) Hazen Est.
BH30-1-A	SS3	Silty Sand/Sandy Silt Till	6.2	2.5 x 10^{-5}
BH30-3-A	SS1	Silty Sand/Sandy Silt Till	4.5	1.0 x 10^{-6}
BH30-6-A	SS1	Silty Sand/Sandy Silt Till	4.5	1.6 x 10^{-5}
BHG7-1-A	SS3	Silty Sand/Sandy Silt Till	7.7	4.9 x 10^{-5}
BH113	SS9	Silty Sand	6.1	1.0 x 10^{-4}
BH115	SS6	Silty Sand/Sandy Silt Till	3.8	4.9 x 10^{-5}
BH116	SS8	Silty Sand/Sandy Silt Till	5.3	1.0 x 10^{-6}
BH117	SS7	Silty Sand/Sandy Silt Till	4.5	2.5 x 10^{-5}

A review of the results indicates that the silty sand/sandy silt till deposit encountered on the subject property has moderately low to very low hydraulic conductivity in the range of 4.9 x 10^{-5} to <1.0 x 10^{-6} cm/sec (two samples had D_{10} < 1 µm). The silty sand deposit encountered in the screened interval of BH113 is estimated to have a moderate hydraulic conductivity of 1.0 x 10^{-4} cm/sec. The remaining samples subjected to grainsize analysis, which are described as either clayey silt till, clayey sandy silt till, clayey silty sand/sandy silt till, or silty sand till, are all interpreted to have very low hydraulic conductivities of <1.0 x 10^{-6} cm/sec.

3.4.2 In Situ Well Tests

Previous bail-down tests were conducted at six locations within the overall Neighbourhood 20 block to estimate the in situ hydraulic conductivity of the overburden sediments and the results were summarized in the NFSSR (2013). Although none of the locations previously tested were within the boundaries of the subject property, they are tests within the same geological deposits and may be considered representative of conditions within the subject property. The results are provided in Appendix E and are summarized based on soil descriptions in Table 2.

Table 2: Summary of Previous Hydraulic Conductivity Test Results

Soil Description	k_{sat} (cm/sec) Bail-Down Test
Clayey Silt to Silty Clay Till	6.0×10^{-7} to 5.8×10^{-6}
Sandy Silt to Silty Sand Till	1.8×10^{-6} to 2.9×10^{-5}
Sand	1.1×10^{-4}

Additional bail-down tests on the subject property were completed by Shad in August 2019 at two locations within the area of the proposed SWMF adjacent to the development area: BH113 and BH117. Borehole BH113 is screened in silty sand (TAC) and BH117 is screened in silty sand/sandy silt till (Newmarket till). The results and methodologies are described in detail in the report entitled “Updated Geotechnical Investigation Report, Thompson’s Corner Phase 1A” completed by Shad and dated August 14, 2019. The testing indicated that the screened sediments at BH113 and BH117 generally have low hydraulic conductivity values of 2.8×10^{-5} and 1.4×10^{-6} cm/sec, respectively, consistent with the previous results. These values are noted to both be one order of magnitude lower than the corresponding results derived from the respective grainsize distribution analysis (Hazen estimation).

3.4.3 Infiltration Testing

Previous in situ infiltration testing was conducted across the Neighbourhood 20 lands by Burnside in May 2011 and summarized in the NFSSR (2013). A total of seven tests were completed using a double-ring infiltrometer installed into the native sediments below the topsoil and the results have been plotted graphical (Appendix E).

Test number N20-IF6 was conducted in the southeast corner of the subject property (Figure 4) within the vadose zone of the sandy silt till sediments underlying the topsoil in that area. The resulting stable infiltration rate (Figure N20-F7, Appendix D) was determined to be approximately 160 mm/hr. Similar tests at nearby locations N20-IF3 to N20-IF5 (Figure N20-F4 to N20-F6, Appendix D) on the surrounding parcels yielded an average infiltration rate of 135 mm/hr, ranging from 25 mm/hr (IF3) to 250 mm/hr (IF5).

3.4.4 Summary of Hydraulic Conductivity and Infiltration Results

The estimated soil hydraulic conductivity ranges are summarized in Table 3. To determine the design infiltration rate, the lower value of the estimated hydraulic conductivity range (or measured infiltration rate if applicable) was selected. The selected hydraulic conductivity was equated to an infiltration rate using approximate relationships and then a safety factor of 2.5 was applied to obtain a design infiltration rate.

The safety factor was chosen to account for a lowering of the permeability of the soils due to compaction and smearing during construction, possible build up of sediments within the infiltration facility over time, and the variability of the clayey materials throughout the subject property. The design infiltration rate was therefore determined to be 4.8 mm/hr for both till deposits encountered on the subject property, and 20 mm/hr for the sand/silty sand deposits.

Table 3: Design Infiltration Rate Summary

Soil Description	K (cm/sec) Range	Measured Infiltration Rate (mm/hr)	Infiltration Rate* (mm/hr)	Design Infiltration Rate (mm/hr)
Clayey Silt to Silty Clay Till	6.0×10^{-7} to 5.8×10^{-6}	-	12	**4.8**
Sandy Silt to Silty Sand Till	1.0×10^{-6} to 4.9×10^{-5}	160	12	**4.8**
Sand to Silty Sand	1.0×10^{-4} to 1.1×10^{-4}	-	50	**20**

* based on the TRCA Stormwater Management Criteria (2012), Appendix C

4.0 Hydrogeology

4.1 Groundwater Monitoring

A total of 15 monitoring wells and 4 drive-point piezometers have been installed across the subject property as part of various studies and are located within the developable limits, the proposed adjacent SWMF, and Wetland U9 (Figure 4). Monitoring of the original well and piezometer locations (MW11-7-1, MW11-7-2s/d, and WPZ-U-09-1s/d) began in May 2011 as part of the MESPA studies and continued monthly to November 2011. Monthly monitoring began again in May 2012 and continued to December 2012. Additional wells BH30-1, BH30-5, BH30-9 and BH30-10 were constructed in January 2018 which were followed by wells BHG7-1-A, BH30-1-A, BH30-5-A, and BH113-117 in July 2019 as part of deeper geotechnical and SWMF investigations. Weekly monitoring at these locations began in mid-July 2019 and continued to the end of September 2019. New piezometer nest WPZ-U-09-2s/d was installed on September 10, 2019.

The monitoring data are summarized in Table D-1 and hydrographs for each location are also provided as Figures D-1 though D-11 in Appendix D. Monitoring is on-going on a monthly basis; the results of the monitoring conducted to date are summarized in the following subsections.

4.1.1 Depth to Groundwater

Groundwater levels are variable across the subject property. Based on the monitoring data available at the time of this report, an interpolated depth to water table figure using September 27, 2019 groundwater elevation data has been prepared to schematically illustrate the depth to the water table (Figure 8). It should be noted that September water level data is generally representative of the seasonally low water table. Depending on climatic factors, the seasonally high levels (typically observed in the late fall and spring) may be between 1 m and 4 m higher based on previous seasonal patterns observed in the Seaton N20 area.

The depths to groundwater can generally be characterized as follows:

- The September 27, 2019 data shows that the seasonally low water levels within the development area are generally between 2.8 to 6.2 mbgs (meters below ground surface). As shown on Figure 8, the groundwater levels are generally more than 4 mbgs through the western and central portions of the subject property, with the lowest groundwater level observed at BHG7-1-A, which was dry at a total depth of 9.8 mbgs. The highest groundwater levels on the subject property were noted to be at MW11-7-1 (3.0 mbgs) along the southern boundary and at BH30-9 (2.8 mbgs) which is located near the northwest boundary of the subject property.

- The water table in the area of the proposed SWMF, which is located in the lowest topographical area between the defined development area and Wetland U9, is very shallow with groundwater levels found above ground surface (flowing) at BH113 down to 3.7 mbgs at BH115. BH113 is screened within the TAC at a depth of 5.6 mbgs to 7.2 mbgs, and the above ground groundwater levels measured in this well represent the pressures within this aquifer.

- When compared to water level data collected in 2011 and 2012 at original wells MW11-7-1 and MW11-7-2s/d, the recent data suggests that the water table can fluctuate by as much as 3.7 m between seasonally high (November 2011) and seasonally low periods (September 2019).

4.1.2 Hydraulic Gradients

Nested monitoring wells (e.g., wells located adjacent to each other but completed at different depths) were installed at three locations to assess vertical hydraulic gradients and groundwater recharge/discharge conditions across the subject property:

- MW11-7-2s/d (Figure D-2, Appendix D) is located southwest of the area proposed for the SWMF. Previous monitoring data indicated gradient reversals at this location, with upwards gradients (discharge conditions) in the spring and summer of 2011 and in August and November 2011. Recent monitoring data has shown similar upwards gradients in August and September 2019. Well BH117, installed adjacent to the nest at a depth between the existing shallow and deep wells, has predominantly showcased water levels lower than the deeper well and higher than the shallow well (after water levels have stabilized post-drilling), confirming an upwards gradient in this area.

- BH30 and BH30-1-A (Figure D-4, Appendix D) are located at the highest topographical area on the subject property. Water levels in the shallower well (BH30-1, well depth 4.8 m) have been dry during all monitoring rounds (January 2018, August and September 2019). Water levels in the deeper well (BH30-1-A, well depth 6.4 m) have been recorded just below the bottom of BH30-1. As topographically higher areas generally correspond to recharge areas, it is interpreted that a downward gradient exists at this location.

- BH30-5 and BH30-5-A (Figure D-5, Appendix D) are located at the eastern extents of the central area of the subject property. BH30-5 was damaged prior to installation of BH30-5-A and no concurrent water level data are available for both wells. BH30-5-A was constructed only 1.2 m deeper than BH30-5 and may be considered more of a replacement well.

- BH113, BH114 and BH115 (Figure D-8, Appendix D), although not constructed immediately adjacent to one another, are located approximately 50 m apart and may be assessed as nested wells. The monitoring data suggests that an upwards gradient (discharge conditions) exist in this area as water levels in the deeper well (BH113) are higher than those in both the shallower wells (BH114 and BH115).

It should be noted that even though upwards hydraulic gradients are observed on the subject property, they may not result in any visual groundwater discharge due to the very low permeability of the surficial till sediments.

It is interpreted that BH113 is screened in the underlying TAC deposits, and nearby MECP water wells within 500 m of the property that are also completed in the TAC show above ground static water level conditions.

4.2 Groundwater Flow Conditions

Groundwater elevation data from September 2019 are shown on Figure 9 with the interpreted groundwater elevation contours and shallow groundwater flow. The majority of water infiltrating directly on the subject property will move laterally north and west

through the surficial topsoil and the more permeable weathered portion of the upper tills towards Urfe Creek and Wetland U9, but the overall low permeability of the tills will generally restrict significant vertical movement. A portion of infiltrating water will flow east towards Brougham Creek, but is generally limited to the southeast and eastern extents of the subject property.

4.2.1 Recharge and Discharge Conditions

Monitoring of the shallow groundwater conditions in and adjacent to Wetland U9 in the area of the proposed SWMF indicates there are upwards gradients present (refer to Section 4.1.2) and that the seasonally high water table is likely within 1 m of surface. However, the monitoring data suggests that gradient reversals occur often (indicative of a weak gradient) and it is interpreted that the low permeability of the surficial tills generally restricts groundwater discharge. Artesian conditions observed in wells completed in the TAC (BH113 and nearby MECP water wells) also speak to the high groundwater pressures underlying the tills.

Groundwater recharge information published by the MECP suggests that the subject property borders a large Significant Groundwater Recharge Area (SGRA) east of the site, and a small portion of that area extends into the southeast corner of the subject property. Stratigraphy mapping suggests that TAC deposits on lands east of the subject property (Greenwood Conservation Area, located approximately 80 m east) are less than 1 m from surface and are likely the determinant for the SGRA designation in that area. However, the borehole logs (BH30-2 and MW11-7-1) suggest that the till deposits in the southeast corner of the subject property are a minimum of approximately 5 m in thickness and groundwater recharge in this area is likely less significant than on the adjacent lands.

5.0 LID Considerations

A three-dimensional groundwater flow model was constructed as part of the MESPA (2013) to assess the potential changes to groundwater recharge, groundwater levels and resulting discharge to surface watercourses that may occur with development. The modelling results provided the following conclusions:

- Low Impact Development (LID) measures should be incorporated into the stormwater management plans for development where possible to reduce the volume of runoff being generated as a result of urbanization.

- LID measures in till areas (i.e., the majority of the subject property) should focus on minimizing the impacts of increased runoff.

- LID measures should generally focus on areas where more permeable sand and gravel deposits are found at or near ground surface, where a minimum of 1.5 m of unsaturated soils exist above the water table.

Infiltration volumes that occur through the till deposits (Table 3, Section 3.4.4) tend to be more limited compared to sandier areas, however, the overall infiltration contribution is still considered important with respect to maintaining the natural heritage conditions, particularly to the shallow surficial soils. This is because the surficial till materials can have moderate infiltration capability due to "secondary hydraulic conductivity". This refers to features that improve the ability of water to move through the shallow subsurface including bedding planes, horizontal and vertical fractures, and vegetation root networks. These features are generally found in the upper weathered portions of the till and are expected to decrease with depth, so the overall deep recharge potential in till areas across the subject property will be more limited than the surficial infiltration.

Based on the information assessed as part of this report for the subject property, the following LID considerations can be made:

- There are no areas on the subject property that have both permeable (high hydraulic conductivity) sandy soils and low water table conditions. Sandy soils encountered on the subject property are associated with the TAC, which has static water levels above existing grade in this area and should be avoided.

- Locations where upwards hydraulic gradients (discharge conditions) and shallow groundwater conditions exist, such as the area of the proposed SWMF, are not suitable for subsurface infiltration facilities.

- Areas of surficial till may be suitable for subsurface infiltration facilities where the water table is relatively deep (Figure 8). These are generally restricted to areas of higher topographical elevation with downwards vertical gradients (recharge).

- All areas are considered suitable for surface LID measures such as increased topsoil depths and directing roof leaders to grass. Potential exists here for moderate infiltration capabilities due to secondary hydraulic conductivity within the weathered zones of the tills.

5.1 Proposed LID Measures for Subject Property

The stormwater management plans, which are detailed in the FSSR completed by Urbantech (2019), include the infiltration of runoff from up to the 5 mm storm event from all impervious areas on the subject property, as per the recommendations of the MESPA.

Two infiltration facilities are proposed: one in the northeast corner of the subject property, along the west boundary of the existing cemetery; and one immediately west of the subject property, approximately 300 m south of Concession Road 5. The soils encountered in both of these areas consist of sandy silt and silty sand till. As discussed in Section 3.4.4, the estimated infiltration rate for these soils is approximately 12 mm/hour (design rate of 4.8 mm/hr). These soils are considered suitable for the proposed infiltration trenches.

Based on the depth to groundwater mapping shown on Figure 8, the depth to groundwater is approximately 4 mbgs at the northeast infiltration facility (elevation 148 masl), and more than 4 mbgs at the western infiltration facility (less than elevation 151 masl). The bottom elevations for the proposed infiltration facilities are 148.50 masl and 151.90 masl, respectively. As such there is approximately 0.5 m to 1 m of separation from the bottom of the proposed facilities and the groundwater. It is noted that the mapped depth to groundwater is based on September 2019 readings, which represent seasonally low conditions. The seasonally high groundwater levels are expected to be 1 m to 4 m higher, and will be confirmed through on-going groundwater level monitoring; however, even if the levels rise above the base of the trenches, these locations would still be considered suitable for seasonal infiltration.

Additional infiltration testing is recommended at the proposed LID locations and bottom elevations in order to finalize sizing and design.

6.0 Construction Considerations

6.1 Construction Below Water Table

The construction of buried services below the water table has the potential to capture and redirect shallow groundwater flow through more permeable fill materials typically placed as bedding in excavated trenches. Over the long-term, these impacts can lower the groundwater table across the development area. Use of appropriate best management practices for servicing and construction across the subject property is recommended where necessary to prevent long-term water table lowering. This will involve the use of cut-off collars or play plugs to provide barriers to flow to prevent groundwater movement along the granular bedding and erosion of the backfill materials.

6.2 Dewatering/Depressurization Requirements

The water table can be seasonally close the existing ground surface in some areas, particularly in the lower topographically areas. Much of the upland area will be above the water table, however, subsurface excavations may encounter wet soil conditions in the spring and fall. Construction dewatering requirements may vary significantly depending on the local soils encountered, climate conditions during construction, and the depth and size of the excavations.

Over most of the subject property, the surficial tills encountered during servicing are anticipated to be of low hydraulic conductivity and are likely to produce little water. As noted earlier, however, fractures or bedding planes within the weathered zones of the till may result in a secondary hydraulic conductivity that can transmit groundwater flow into excavations but are anticipated to be manageable. Artesian conditions exist in the underlying sand and gravel deposits (TAC) below the surficial tills on the subject property, which may produce significant volumes of groundwater. If deeper excavations are proposed, more active dewatering/depressurization or groundwater control systems involving networks of well points or groundwater control wells may be required. If required, additional dewatering requirements and anticipated flow volumes, including a groundwater management plan and sediment control system will be confirmed by geotechnical and hydrogeological investigations completed in support of the detailed servicing design.

Recently the MECP has introduced new regulations that allow for construction related dewatering to be processed under the streamlined Environmental Activity Sector Registry (EASR) if dewatering volumes are anticipated to be between 50,000 to 400,000 L/day. If construction dewatering is anticipated to be in excess of 400,000 L/day, a Permit to Take Water (PTTW) is required from the MECP which involves the submission of a detailed Category 3 PTTW application and supporting technical report. Neither an EASR approval or a PTTW is required if groundwater takings for dewatering are less than 50,000 L/day.

6.3 Private Water Wells

There are existing private wells on and adjacent to the Subject Lands. It is important to ensure that development construction activities do not adversely affect local groundwater supplies.

Prior to construction, a survey of the local wells (i.e., those wells located within approximately 200 m of the construction area) should be completed. The purpose of the survey is to understand where the local water supply wells are located with respect to the construction area and how they are used. The well survey will record information on well location, age, depth, type of construction (e.g., drilled or dug wells), volume of water available, pumps and typical water usage, general water quality, etc. With permission of the well owners, the groundwater level will be measured in active and accessible water supply wells during non-pumping conditions prior to the commencement of earthworks and a water sample will be collected at each well for analysis of background turbidity levels. It is necessary to record the well conditions preconstruction, monitor the water levels during the construction (at least once depending on the length of the earthworks period) and then record the well conditions post-construction to confirm no adverse impacts related to the site activities have occurred.

6.4 Well Decommissioning

Prior to or during construction, it is necessary to ensure that all inactive wells within the development footprint have been located and properly decommissioned by a licensed well contractor according to O.Reg 903. This regulation applies to active and inactive water supply wells and the groundwater monitoring wells installed for the hydrogeological and geotechnical studies unless they are maintained throughout the construction period for monitoring purposes.

7.0 References

Chapman, L.J. and D.F. Putnam, 1984. The Physiography of Southern Ontario, Third Edition; Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map 2715.

GHD et al., Neighbourhood Functional Servicing and Stormwater Report (NFSSR), Neighborhood 20, Seaton Community, 2013.

Hazen, A. 1892. Some Physical Properties of Sands and Gravels. Massachusetts State Board of Health, Annual Report, 539-556.

Hvorslev, MJ. Time Lag and Soil Permeability in Groundwater Observations. Vicksburg: US Army Corps of Engineers, Waterway Experimentation Station; 1951.

Ontario Geological Survey. 1991. Bedrock Geology of Ontario, southern sheet, Ontario Geological Survey, Map 2544, scale 1:1,000,000.

Ontario Ministry of the Environment, Storm Water Management Planning and Design Manual, March 2003.

Ontario Ministry of the Environment, Conservation and Parks, Water Well Records.

R.J. Burnside & Associates Limited, Seaton Neighbourhood 20, Hydrogeological Assessment, August 2013.

Sernas Group et al, July 2013. Master Environmental Servicing Plan Amendment, Seaton Community.

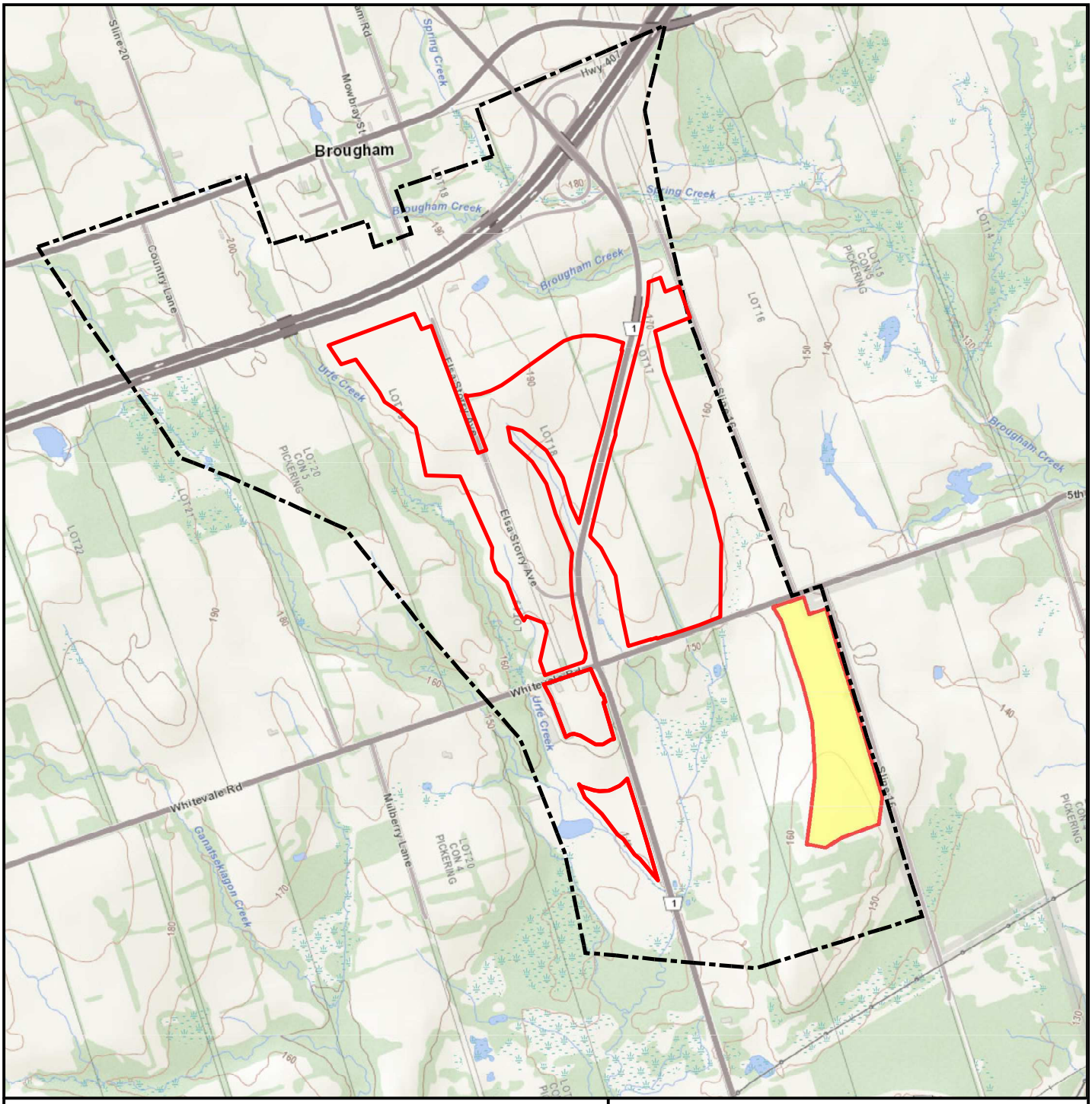
Shad & Associates Inc., January 25, 2015. Geotechnical Investigation Report, Seaton I/O Lands – Area 30.

Shad & Associates Inc., August 14, 2019. Updated Geotechnical Investigation Report, Thompson’s Corner – Phase 1A.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Figures



LEGEND

- SEATON N20 NFSSR BOUNDARY
- SUBJECT LANDS (PHASE 1A)
- THOMPSON'S CORNERS LANDS

0 250 500 1,000 1,500
Meters

N

BURNSIDE

Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title:

SITE LOCATION

Drawn	Checked	Date	Figure No.
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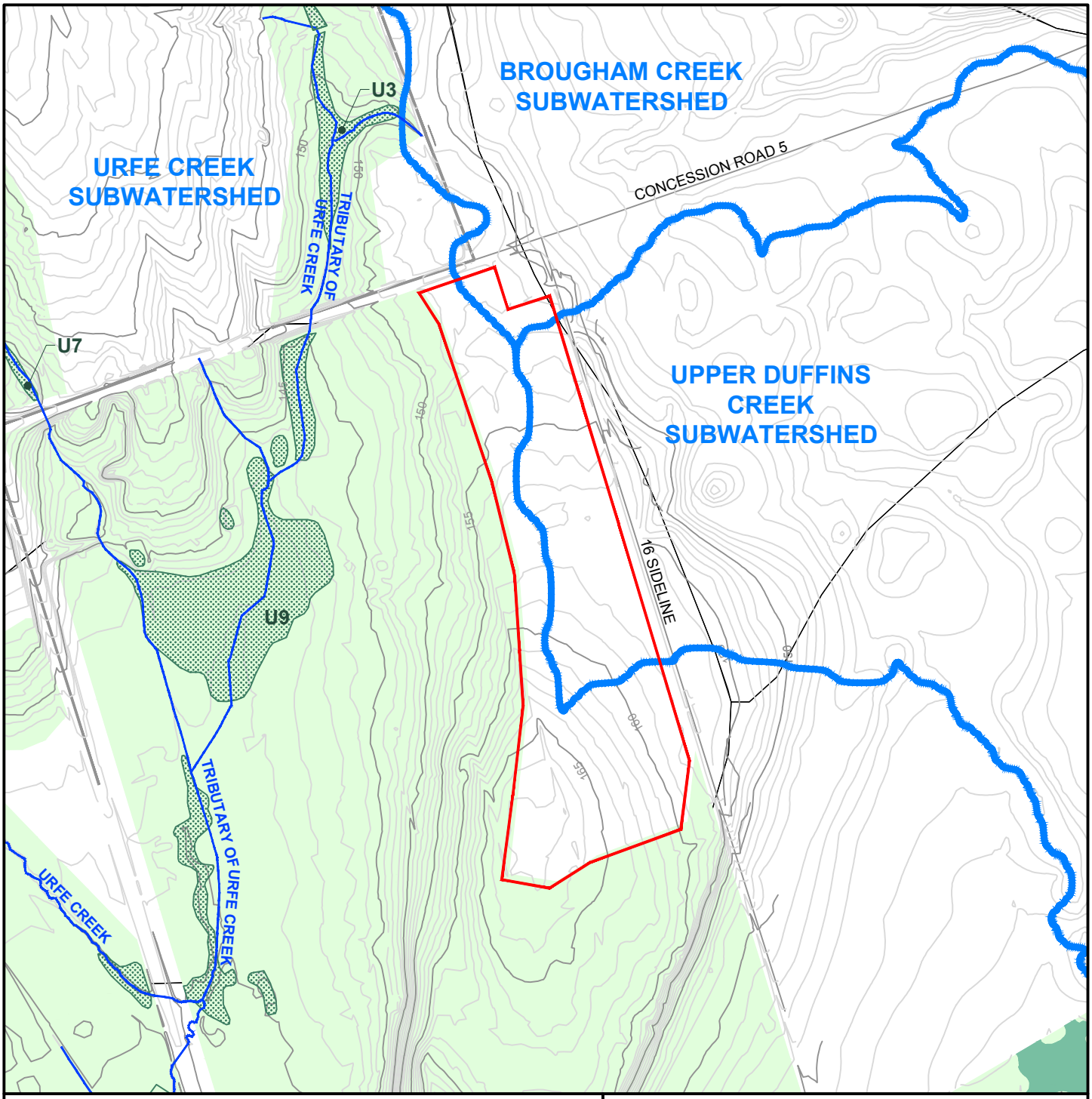

LEGEND

- SUBJECT LANDS (PHASE 1A)
- SUBWATERSHED BOUNDARY
- CONTOUR (5m intervals - masl)
- CONTOUR (1m intervals)
- WATERCOURSE
- ROADWAY
- NATURAL HERITAGE SYSTEM
- TRCA WETLANDS (WITHIN NHS)
- CPDP WETLANDS (WITHIN NHS)
- U9 WETLANDS LABELS

0 50 100 200 300 400 500 600
Metres

N

BURNSIDE

Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

TOPOGRAPHY AND DRAINAGE

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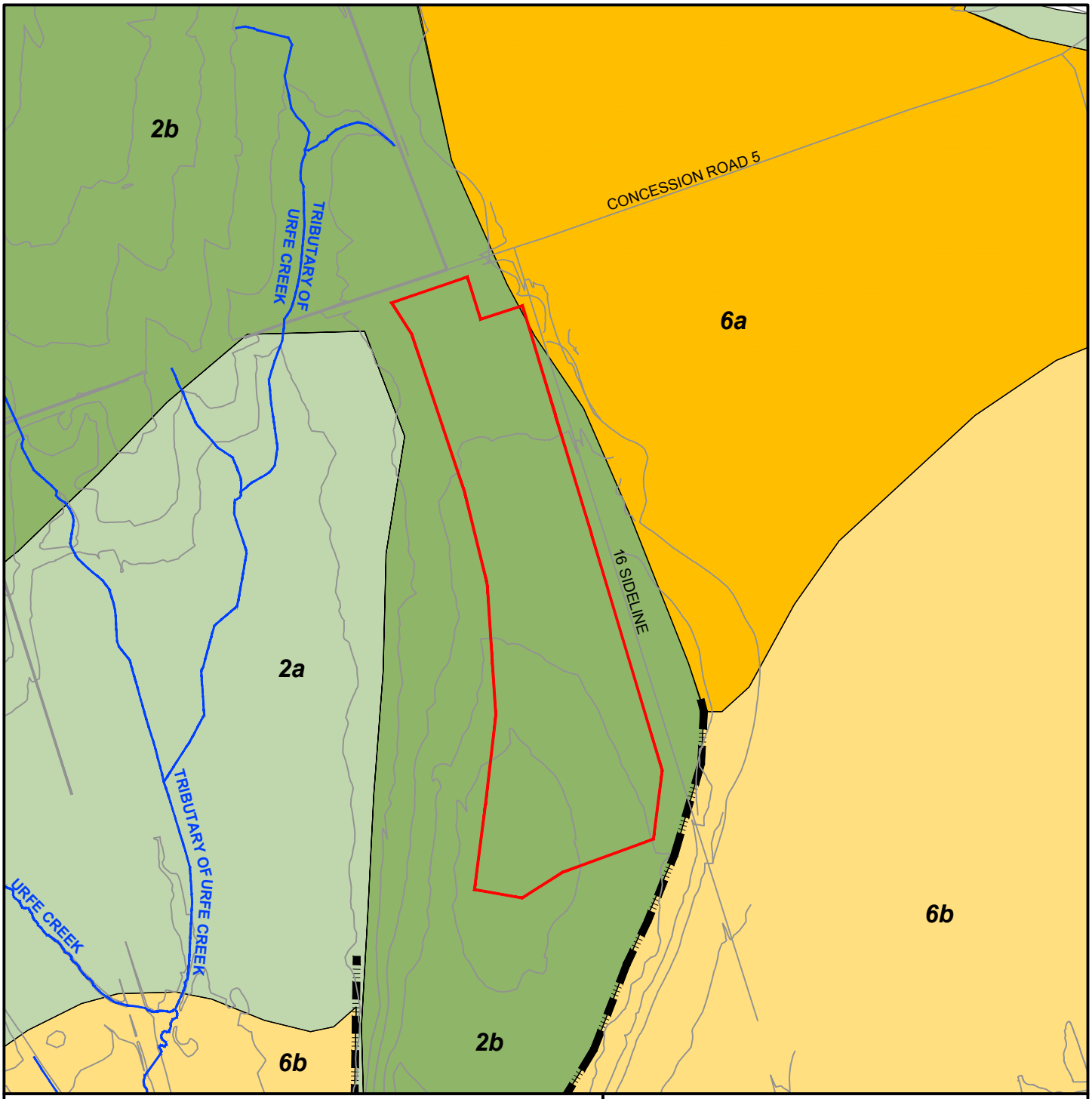

LEGEND

- SUBJECT LANDS (PHASE 1A)
- WATERCOURSE
- ROADWAY
- CONTOUR (5m intervals - masl)
- IROQUOIS SHORELINE

SURFICIAL GEOLOGY

- 2a: Newmarket Till: sandy silt to silty sand till
- 2b: Halton Till: sandy silt facies
- 6a: Gravel, gravelly sand
- 6b: Sand, silty sand

Data Reference: Ontario Geological Survey 2003. Surficial Geology of Southern Ontario; Miscellaneous Release - Data 128

0 50 100 200 300 400 500 600
Metres

N

BURNSIDE

Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

SURFICIAL GEOLOGY

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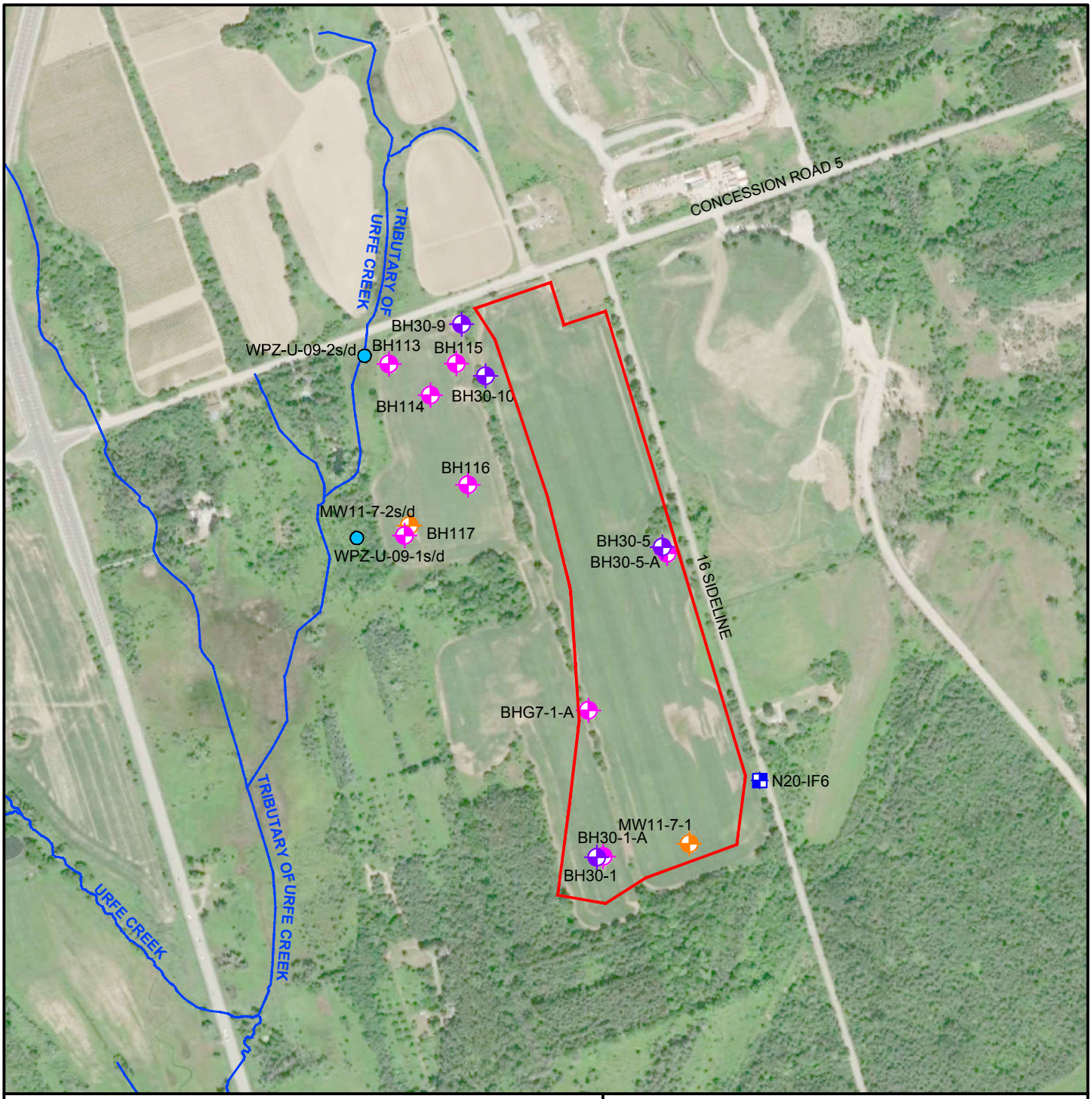

LEGEND

- SUBJECT LANDS (PHASE 1A)
- WATERCOURSE
- MONITORING WELL (GOLDER 2011)
- MONITORING WELL (SHAD 2019)
- MONITORING WELL (SHAD 2018)
- DRIVE POINT PIEZOMETER
- INFILTRATION TEST LOCATION

0 100 200 400 600
Metres

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Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

MONITORING LOCATIONS

Drawn	Checked	Date	Figure No.
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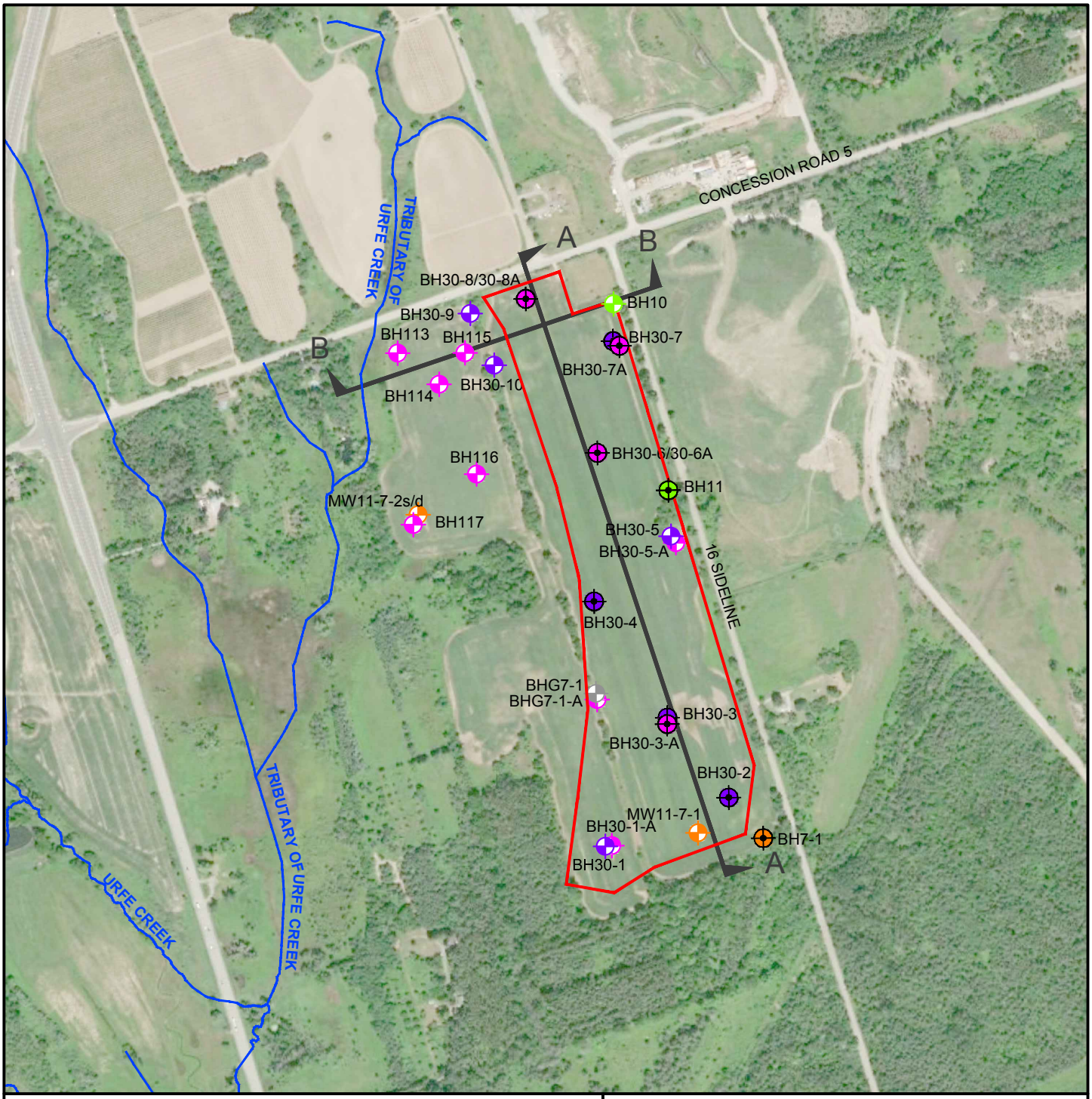

LEGEND

- SUBJECT LANDS (PHASE 1A)
- WATERCOURSE
- MONITORING WELL (GOLDER 2011)
- MONITORING WELL (SHAD 2019)
- MONITORING WELL (SHAD 2018)
- MONITORING WELL (SIRATI 2017)
- MONITORING WELL (DESTROYED)
- BOREHOLE (SHAD 2018)
- BOREHOLE (SIRATI 2017)
- BOREHOLE (GOLDER 2011)
- BOREHOLE (SHAD 2019)

A A' CROSS-SECTION LOCATION KEY

0 100 200 400 600
Metres

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Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

BOREHOLE, WELLS AND CROSS-SECTION LOCATIONS

Drawn	Checked	Date	Figure No.
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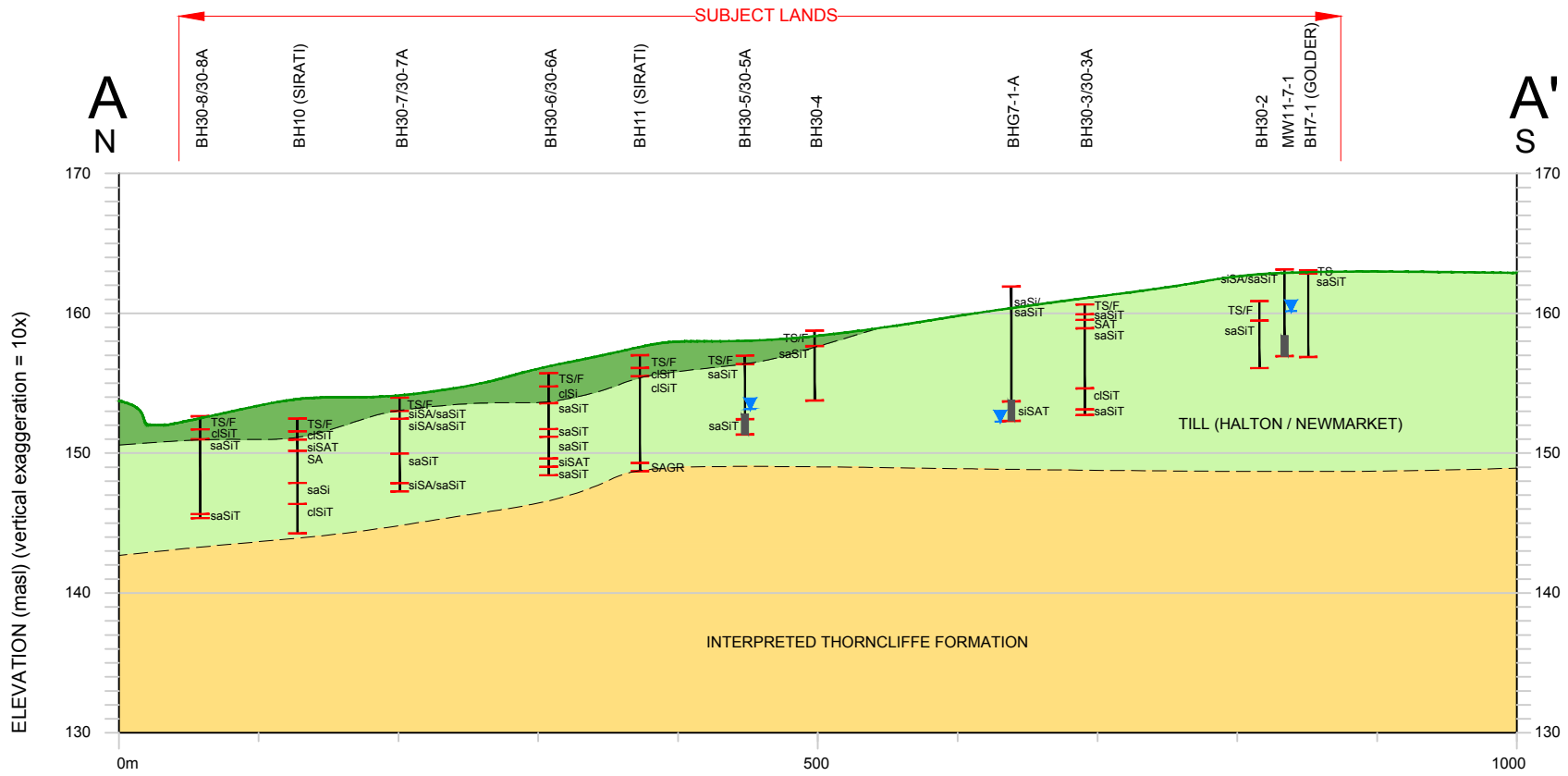

LEGEND

BH1 — WELL NUMBER / ID

EXISTING GROUND PROFILE

GEOLOGICAL CONTACT

MEASURED WATER LEVEL (SEPTEMBER, 2019)

WELL SCREEN

si	SILTY
sa	SANDY
cl	CLAYEY
GR	GRAVEL
SA	SAND
Si	SILT
CL	CLAY
ST	STONES
LSMN	LIMESTONE

INTERPRETED STRATIGRAPHY

SAND / SILT / GRAVEL

SILTY SAND TILL

TOPSOIL / CLAYEY SILT TILL

BURNSIDE

Client/Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED GEOLOGICAL CROSS-SECTION A-A'

Drawn	Checked	Date	Figure No.
SK	JS	NOVEMBER 2019	6
Scale		Project No.	
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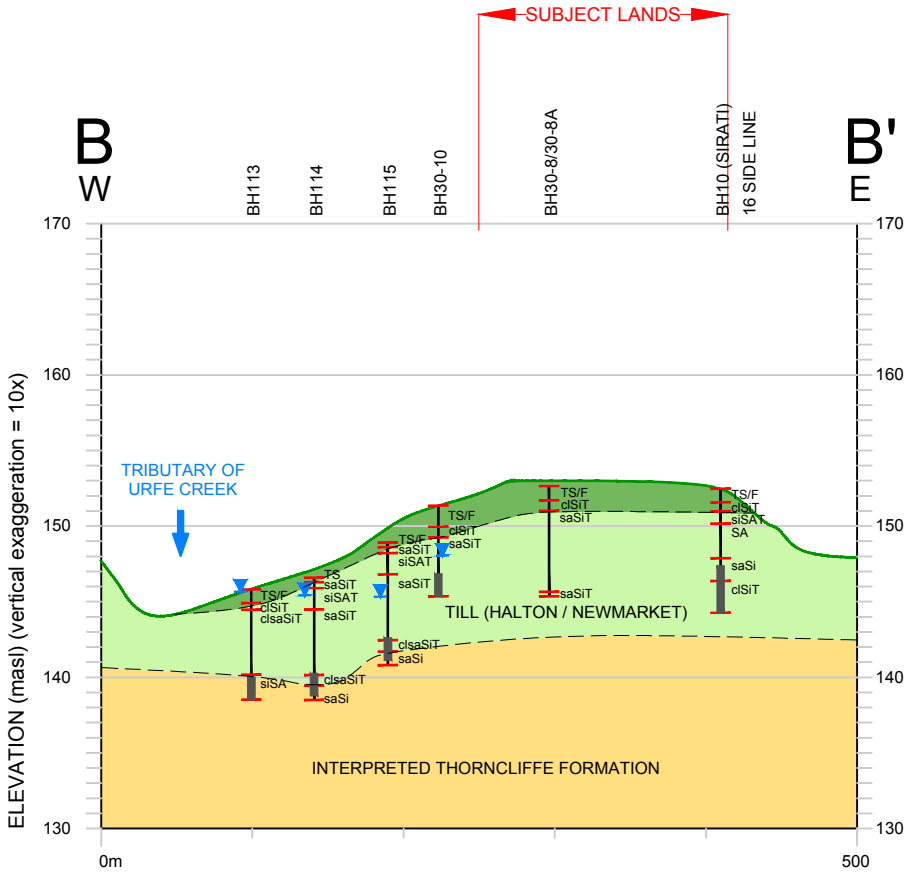
File Name: 8.5 x 11 landscape horizontal.dwg Date Plotted: June 9, 2014 - 11:51 AM



LEGEND

BH1 — WELL NUMBER / ID

EXISTING GROUND PROFILE

GEOLOGICAL CONTACT

MEASURED WATER LEVEL (SEPTEMBER, 2019)

WELL SCREEN

si	SILTY
sa	SANDY
cl	CLAYEY
GR	GRAVEL
SA	SAND
Si	SILT
CL	CLAY
ST	STONES
LSMN	LIMESTONE

INTERPRETED STRATIGRAPHY

SAND / SILT / GRAVEL

SILTY SAND TILL

TOPSOIL / CLAYEY SILT TILL

BURNSIDE

Client/Report

THOMPSON'S CORNERS
PHASE 1A LANDS

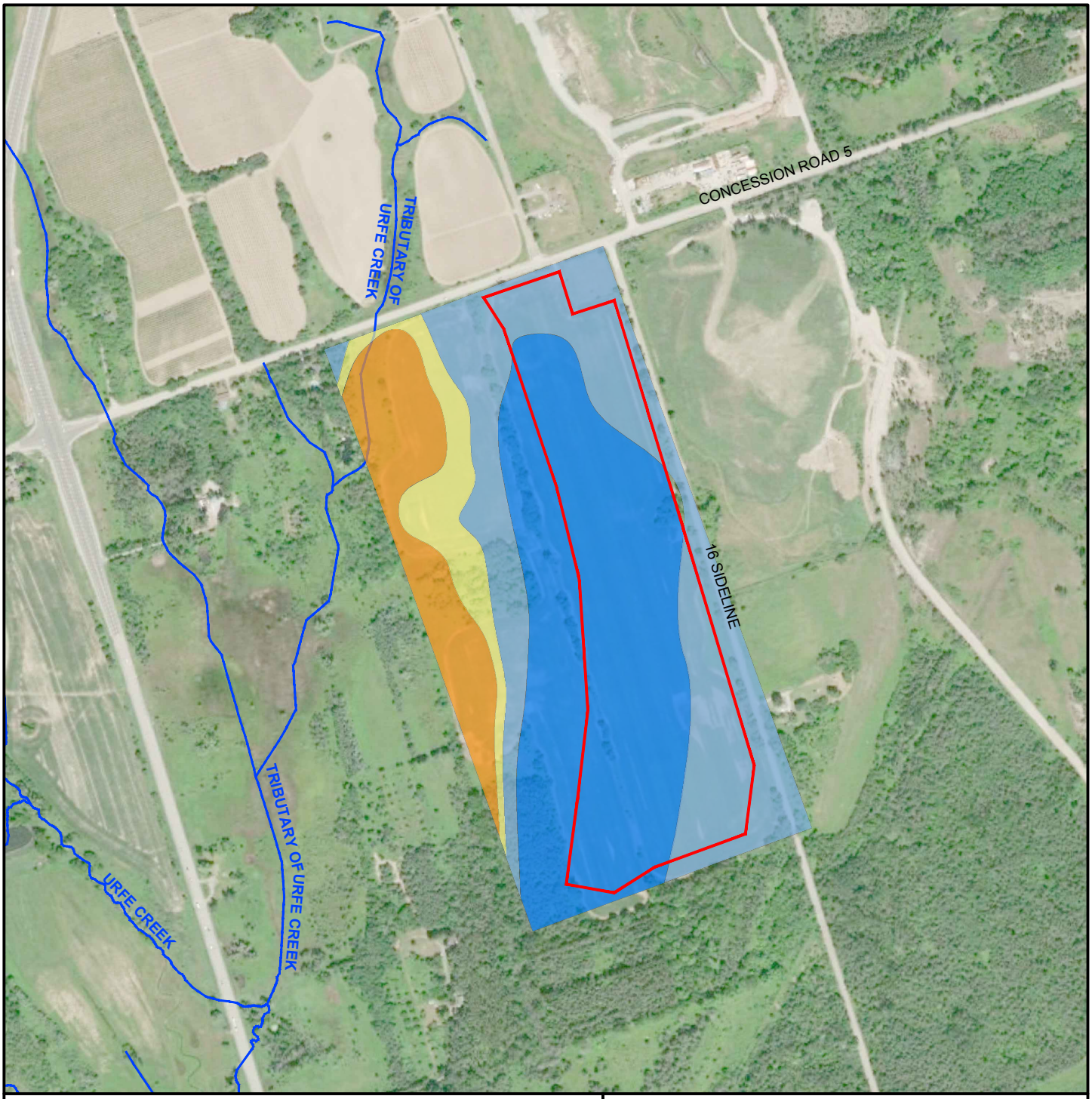
HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED GEOLOGICAL CROSS-SECTION B-B'

Drawn	Checked	Date	Figure No.
SK	JS	NOVEMBER 2019	7
Scale		Project No.	
1:5,000		300050288	

File Name: 8.5 x 11 landscape horizontal.dwg Date Plotted: June 9, 2014 - 11:51 AM



LEGEND

- SUBJECT LANDS (PHASE 1A)
- WATERCOURSE

DEPTH TO WATER TABLE

- 0 TO 1M BELOW GRADE
- 1 TO 2M BELOW GRADE
- 2 TO 4M BELOW GRADE
- >4M BELOW GRADE

0 100 200 400 600
Metres

N

BURNSIDE

Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

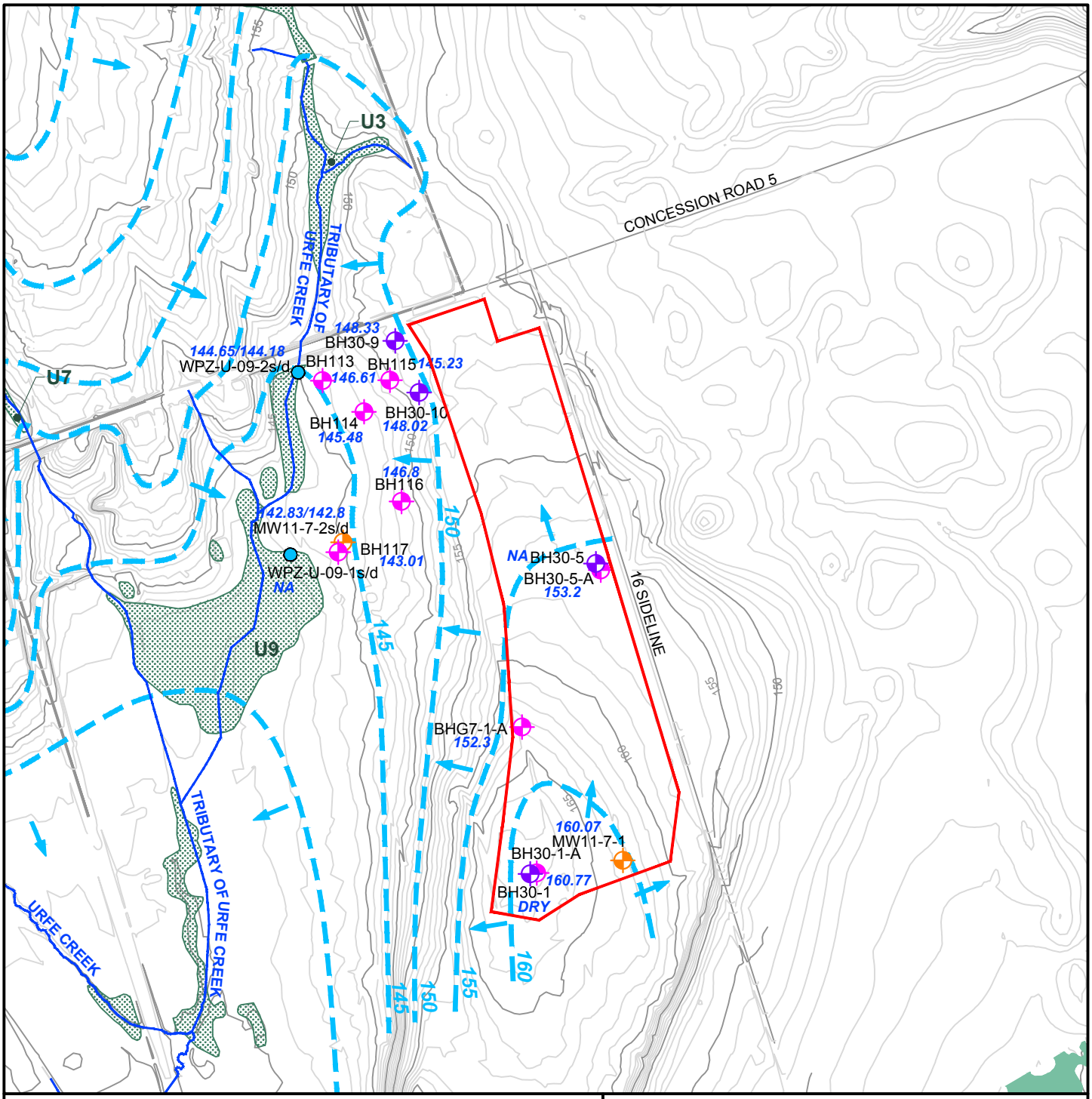
HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED DEPTH TO GROUNDWATER

Drawn	Checked	Date	Figure No.
SK	JS	NOVEMBER 2019	8
Scale		Project No.	
1:7,500		300050288	

File Name: N:\gel\Shared Work Areas\044345 Oakvillage\050288 Phase 1A Drawing Set.dwg Date Plotted: November 11, 2019 - 2:08 PM



LEGEND

- SUBJECT LANDS (PHASE 1A)
- CONTOUR (5m intervals - masl)
- CONTOUR (1m intervals)
- WATERCOURSE
- ROADWAY
- NATURAL HERITAGE SYSTEM
- TRCA WETLANDS (WITHIN NHS)
- CPDP WETLANDS (WITHIN NHS)
- INTERPRETED GROUNDWATER CONTOUR (masl)
- 161.9 MEASURED WATER LEVEL (SEPTEMBER 27, 2019)
- INTERPRETED GROUNDWATER FLOW DIRECTION
- MONITORING WELL (SHAD 2018)
- MONITORING WELL (GOLDER 2011)
- MONITORING WELL (SHAD 2019)
- DRIVE POINT PIEZOMETER

0 50 100 200 300 400 500 600
Metres

N

BURNSIDE

Client / Report

THOMPSON'S CORNERS
PHASE 1A LANDS

HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED GROUNDWATER FLOW

Drawn	Checked	Date	Figure No.
SK	JS	NOVEMBER 2019	9
Scale		Project No.	
1:7,500		300050288	

File Name: N:\gel\Shared Work Areas\044345 Oakvillage\050288 Phase 1A Drawing Set.dwg Date Plotted: November 11, 2019 - 2:09 PM

BURNSIDE

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Appendix A

MECP Well Records

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
AJAX TOWN CON 04 014	17 654533 4862934 W	1959/11 1413	6		70/76/8/4:0	DO		4601418 ()	GRVL 0010 GRVL CLAY 0022 CSND 0043 QSND 0047 SILT CLAY 0070 CLAY GRVL 0091 MSND 0092 BLUE CLAY 0104 SILT 0116 GRVL 0121
AJAX TOWN CON 04 014	17 654625 4863363 W	1952/09 2801	2	FR 0044	-17/-10/90/8:0	NU	0044 10	4601411 ()	BLCK MUCK 0012 GRVL 0020 MSND 0031 CLAY SILT 0040 MSND GRVL 0048 GRVL 0060 CLAY 0062 CLAY GRVL 0069
AJAX TOWN CON 04 014	17 654395 4863323 W	1952/09 2801	6					4601415 ()	CLAY 0003 MSND GRVL 0020 CLAY GRVL 0085 CLAY 0094 MSND SILT 0102 CLAY GRVL 0111 CLAY STNS 0119
AJAX TOWN CON 04 014	17 654530 4863363 W	1952/09 2801	6					4601416 ()	LOAM 0002 MSND 0010 GRVL 0021 BRWN CLAY MSND 0031 GRVL 0034 BRWN CLAY MSND 0053 BLUE CLAY 0091 BLUE CLAY 0104 GRVL CLAY 0112 CLAY 0124 SHLE 0125
AJAX TOWN CON 04 015	17 654105 4863073 W	1970/04 2214	30	FR 0020	20/30/4/1:0	DO		4604391 ()	BRWN MSND 0032
AJAX TOWN CON 04 015	17 654595 4862533 W	1952/08 2801	6					4601421 ()	GRVL BLDR 0004 MSND 0008 BRWN CLAY MSND GRVL 0047 GRVL 0048 BLUE CLAY 0052 BLUE CLAY SILT 0083 BLUE CLAY GRVL BLDR 0089 BRWN CLAY GRVL 0114 BLUE SHLE 0119
AJAX TOWN CON 04 015	17 654261 4863061 W	1965/08 5412	30	FR 0017	15//2/:	PS		4601423 ()	LOAM 0001 FSND 0022
AJAX TOWN CON 04 016	17 653655 4862823 W	1976/02 5459	6	FR 0190	34/190/20/2:0	DO	0197 6	1904687 ()	BRWN SAND GRVL 0025 BLUE CLAY STNS 0140 BLUE CLAY SAND 0190 BLUE MSND 0205
PICKERING TOWN	17 653607 4862958 W	2017/03 7230	2.00	UT 0017		TH	0013 12	7288764 (Z257948) A223631	BLCK LOAM LOOS 0001 BRWN SAND FILL LOOS 0003 BRWN CLAY SILT HARD 0005 BRWN SAND SILT HARD 0020 GREY CLAY SILT HARD 0025
PICKERING TOWN	17 652749 4862825 W	2007/02 7241	2			OT MO	0009 10	7107703 (Z59422) A051837	BRWN SAND SOFT FILL 0012 BRWN SAND SILT WBRG 0015 GREY CLAY SILT WBRG 0019
PICKERING TOWN	17 652736 4862538 W	2017/03 7230	2.00	UT 0003		TH	0013 12	7288765 (Z257949) A223633	BLCK LOAM LOOS 0001 BRWN SAND FILL LOOS 0003 BRWN CLAY SILT TILL 0015 GREY SAND SILT TILL 0025
PICKERING TOWN	17 652881 4862946 W	2006/03 4868	11.8			DO		1918135 (Z42104) A	
PICKERING TOWN	17 652987 4862261 W	2006/05 1129	2.00				0052 8	1918337 (Z48756) A039885	BLCK SILT CLAY SAND 0008 GREY SAND SILT CLAY 0011 GREY SAND GRVL 0023 GREY SILT SAND 0030 GREY SAND GRVL 0042 GREY SILT CLAY SAND 0047 GREY SAND GRVL LOOS 0060 GREY SILT CLAY 0061
PICKERING TOWN	17 652901 4862802 W	2015/12 7472	0.69			MO	0015 5	7259851 (Z227563) A197518	---- ---- PCKD 0001 BRWN SAND GRVL PCKD 0012 GREY CLAY SILT LOOS 0020
PICKERING TOWN 04 017	17 653387 4862050 W	2005/05 4868	35.8			DO		1917568 (Z28854) A	
PICKERING TOWN 04 018	17 653292 4862090 W	2005/03 3030	36 36	0005 0014 0020	9///:	DO		1917500 (Z23392) A023141	BRWN LOAM 0001 BRWN SAND 0005 BRWN SAND 0014 BRWN SAND STNS 0020 BRWN CSND LYRD 0025 BLUE CLAY
PICKERING TOWN 04 018	17 653322 4862105 W	2005/05 4868	6			DO		1917566 (Z28855) A	
PICKERING TOWN 05 014	17 654357 4863360 W	1988/01 2801	5			NU	0084 2	1909224 (23763) A	LOAM 0001 SILT VERY FSND 0006 SAND GRVL 0013 BRWN GRVL CLAY 0016 SAND GRVL 0025 BRWN CLAY SAND GRVL 0031 SAND GRVL 0034 GREY CLAY SLTY SOFT 0045 GREY CLAY SLTY GRVL 0048 GREY CLAY SLTY SOFT 0068 GREY CLAY STNY 0084 CLAY GRVL 0086 GREY CLAY STNS 0092 BLDR 0094 CLAY GRVL 0106 GREY CLAY STNY HARD 0115 CLAY SHLE LYRD 0129 BLCK SHLE 0133
PICKERING TOWN 05 018	17 653068 4862827 W	2006/12 3406						7040032 (Z56849) A	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
PICKERING TOWN CON 04 017	17 653707 4861979 L	2001/04 4102						1915040 (227502)	
PICKERING TOWN CON 04 017	17 653253 4861464 W	1993/04 1673	6	FR 0066	20/61/5/2:0	DO	0063 3	1912396 (104031)	LOAM 0001 SAND CLAY 0021 CLAY GRVL 0047 SILT CLAY 0061 SAND GRVL 0066
PICKERING TOWN CON 04 017	17 653707 4861979 L	2001/02 2662	6 6	FR 0053	19/32/8/2:0	DO	0050 3	1915266 (228262)	BLCK LOAM SOFT 0002 GREY CLAY SAND STNS 0017 GREY CLAY SAND PCKD 0040 BRWN FSND CLAY LOOS 0047 BRWN CSND 0053
PICKERING TOWN CON 04 017	17 653707 4861979 L	2001/05 2662						1915281 (228797) A	
PICKERING TOWN CON 04 017	17 653707 4861979 L	2001/03 7118	6	FR 0075 FR 0085	8/19/10/2:30	DO	0080 4	1915049 (227259)	BLCK LOAM SOFT 0002 BRWN FSND SOFT 0021 GREY SILT FSND SOFT 0070 GREY MSND FGVL HARD 0075 GREY FGVL MSND DNSE 0080 GREY CLAY GRVL HARD 0081 GREY GRVL FSND DNSE 0085
PICKERING TOWN CON 04 017	17 653601 4862526 W	1966/10 5412	30	FR 0026	8//2/:	DO		4601425 ()	LOAM 0001 BRWN CLAY 0010 BLUE CLAY 0026 BLUE CLAY MSND 0032
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/12 3367						1915529 (241007)	
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/02 7118	6	FR 0090	16/81/10/2:0	DO		1914990 (227253)	BRWN LOAM 0001 BRWN SAND FGVL 0009 GREY SAND FGVL 0025 GREY BLDR 0027 GREY SAND CLAY THIK 0032 GREY GRVL FSND 0090 GREY GRVL 0091
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/12 3367	6	FR 0129	40/80/15/2:0	DO	0126 3	1915526 (241002)	BRWN LOAM SOFT 0003 BRWN GRVL SAND CLAY 0035 GREY SAND CLAY SOFT 0080 GREY CLAY DNSE 0085 GREY CLAY GRVL PCKD 0126 BRWN CSND WBRG LOOS 0129
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/08 1413	8 6	FR 0142	/40/50/1:0	DO	0137 5	1915358 (229806)	BRWN CLAY HARD 0015 GREY CLAY HARD 0132 GREY FSND 0142
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/05 2662				NU		1915294 (228290) A	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/07 2662						1915280 (228354) A	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/02 2662	10 6	FR 0038	3/8/5/2:0	DO	0032 3	1915275 (228249)	BLCK LOAM 0002 BRWN CLAY STNS 0009 GREY CLAY SLTY 0012 GREY SAND GRVL SLTY 0018 GREY CLAY SLTY 0027 GREY CLAY SOFT 0031 GREY SAND GRVL 0038 CLAY SLTY 0039
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/12 2662	6 6	UK 0078	10/37/12/1:45	DO	0074 4	1915589 (236666)	BRWN LOAM 0001 BRWN SAND LOAM 0006 BRWN CLAY SNDY 0014 GREY CLAY SNDY 0031 GREY SAND SILT 0062 GREY CLAY STNS 0069 BRWN SAND GRVL WBRG 0078 GREY CLAY GRVL 0078
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/02 7118	6	FR 0070	13/64/10/2:0	DO		1914991 (215228)	BRWN LOAM 0001 BRWN FSND CLAY SOFT 0009 BRWN CSND GRVL HARD 0018 GREY CLAY GRVL HARD 0021 BRWN FSND FGVL HARD 0032 GREY FSND CLAY DNSE 0054 GREY FSND GRVL DNSE 0070 GREY GRVL 0074
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/05 7118	6	FR 0070	13/64/10/2:0	DO		1915051 (215917)	BRWN LOAM 0001 BRWN SAND CLAY 0012 GREY CLAY THIK 0021 GREY SAND FGVL 0070 GREY GRVL CSND 0074
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/05 7118						1915154 (232639) A	
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/05 7118						1915155 (232621) A	
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/05 7118						1915156 (232637) A	
PICKERING TOWN CON 04 018	17 653317 4861848 L	2001/05 7118						1915157 (232638) A	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 6974				DO		1915744 (244621)	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/03 2662	6	FR 0050	23/24/7/1:30	DO		1915262 (228268)	BLCK LOAM 0001 BRWN CLAY SNDY GRVL 0010 BRWN GRVL SAND 0030 GREY CLAY SNDY 0041 BRWN GRVL SAND 0050

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
PICKERING TOWN CON 04 018	17 653317 4861847 L	2001/02 2662	8 8 6	UK 0125	-2/0/35/1:0	DO	0122 3	1915271 (228244)	BLCK LOAM 0001 BRWN CLAY SNDY LOOS 0015 GREY CLAY STNS HARD 0045 GREY CLAY 0123 GREY CLAY STNS 0125 GREY CSND 0126 GREY CLAY 0127
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 1413				DO		1915794 (241494) A	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/01 3367	6	FR 0061	16/47/8/2:30	DO	0057 4	1915633 (241022)	BRWN LOAM LOOS 0002 BRWN CLAY GRVL STNS 0010 GREY CLAY GRVL PCKD 0030 GREY SAND CLAY GRVL 0057 GREY SAND LOOS 0061
PICKERING TOWN CON 04 018	17 653055 4862843 W	1971/09 1556	30	FR 0030	25/38/1/1:0	DO		4604845 ()	BLCK LOAM 0001 BRWN CLAY MSND BLDR 0010 BRWN MSND BLDR 0015 BRWN CLAY STNS 0024 BLUE CLAY BLDR 0030 BLUE CLAY GRVL 0034 BLUE CLAY BLDR 0039
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 3367				DO		1915694 (241059) A	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 6974	36			NU		1915755 (244609)	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 6974	30			DO		1915756 (244607)	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/10 2662	6	UK 0117	-3/63/3/1:30	DO		1916326 (252340)	BLCK LOAM 0001 BRWN SAND 0009 BRWN SAND GRVL 0018 BRWN CLAY SNDY GRVL 0020 GREY CLAY SNDY GRVL 0051 GREY SILT GRVL SAND 0067 RED GRNT SILT CLAY 0070 GREY CLAY 0082 GREY CLAY GRVL 0084 GREY CLAY 0114 GREY SAND WBRG 0115 BLCK SHLE 0118 BLCK SHLE 0168
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/04 3367				DO		1915922 (241083) A	
PICKERING TOWN CON 04 018	17 653024 4862207 W	1965/09 5412	30	FR 0005	5//3/:	DO		4601433 ()	BRWN CLAY 0005 CSND 0015
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 3367						1915686 (241055)	
PICKERING TOWN CON 04 018	17 653317 4861847 L	2002/03 2662						1915911 (236740) A	
PICKERING TOWN CON 04 019	17 652985 4862260 W	2014/04 5459	2			NU	0054 10	7220079 (Z168130) A	
PICKERING TOWN CON 04 019	17 652929 4861718 L	1999/04 6874	30	FR 0016	16/23/25/2:30	DO		1913994 (199685)	BRWN SAND 0023
PICKERING TOWN CON 04 019	17 652715 4862713 W	1969/08 2214	30	FR 0017	17/25/4/1:0	DO		4604137 ()	BLCK LOAM 0002 BRWN CLAY MSND 0015 GRVL 0017 BLUE CLAY STNS 0033
PICKERING TOWN CON 04 019	17 652927 4861718 L	2000/12 2662	6	FR 0078	11/37/6/3:	DO	0075 3	1914967 (216682)	BRWN SAND GRVL 0006 BRWN SAND WBRG 0014 GREY CLAY SLTY 0044 GREY CLAY SNDY GRVL 0075 GREY SAND WBRG 0079 GREY CLAY SNDY GRVL 0080
PICKERING TOWN CON 04 019	17 652775 4862712 W	1996/04 6874	30	FR 0020	15/22/25/1:0	DO		1912809 (158041)	
PICKERING TOWN CON 04 019	17 652927 4861717 L	2001/02 2662	6	FR 0118	27/27/6/1:45	DO		1915269 (228253)	BLCK LOAM 0002 BRWN SAND STNS 0023 GREY CLAY SLTY 0050 GREY CLAY SNDY GRVL 0102 GREY SAND WBRG 0105 GREY GRVL WBRG 0118
PICKERING TOWN CON 04 019	17 652927 4861717 L	2002/02 2662				NU		1915897 (236745) A	
PICKERING TOWN CON 04 019	17 652927 4861717 L	2001/06 2662				NU		1915287 (228319) A	
PICKERING TOWN CON 04 019	17 652927 4861717 L	2001/06 2662				NU		1915290 (228318) A	
PICKERING TOWN CON 04 019	17 652927 4861717 L	2001/09 2662						1915583 (228396) A	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
PICKERING TOWN CON 04 019	17 652927 4861717 L	2001/07 2662	6	UK 0055	16/38/3/4:0	DO	0052 3	1915587 (228341)	BLCK LOAM 0002 BRWN SAND GRVL 0005 BRWN CLAY SNDY GRVL 0011 GREY CLAY SNDY GRVL 0048 GREY SAND GRVL SILT 0055
PICKERING TOWN CON 04 019	17 652927 4861717 L	2002/03 3136						1915675 (242092) A	
PICKERING TOWN CON 04 020	17 652689 4862658 W	1999/06 5459	6 10					1914169 (195505)	
PICKERING TOWN CON 04 020	17 652687 4862658 W	1999/06 5459	6	FR 0134	30/88/20/8:		0135 15	1914168 (195506)	BRWN CLAY 0020 GREY CLAY SOFT 0024 GREY CLAY SAND 0062 GREY CLAY HARD 0120 BLCK CLAY HARD 0134 GREY SAND 0152
PICKERING TOWN CON 04 020	17 652688 4862658 W	1999/06 5459	6					1914170 (195504)	
PICKERING TOWN CON 05	17 652785 4862904 W	2006/03 4868	14.1			ST		1918171 (Z42105) A	
PICKERING TOWN CON 05 014	17 654480 4863393 W	1971/11 1556	30	FR 0016 FR 0024	16/31/4/1:0	DO		4605063 ()	BLCK LOAM 0003 BRWN CLAY STNS 0016 GREY CLAY GRVL 0024 GREY GRVL MSND 0028 BLUE CLAY STNS 0032
PICKERING TOWN CON 05 015	17 653892 4863239 W	1960/08 2801	5					4601489 ()	FILL MSND 0009 BLUE CLAY 0029 CLAY GRVL 0047 GRVL CLAY 0050 CLAY GRVL 0069 CLAY 0082 SHLE 0084
PICKERING TOWN CON 05 015	17 654090 4863444 W	1960/12 2801	10	FR 0080	0/39/150/6:0	CO	0082 10	4601492 ()	MSND GRVL CLAY 0004 MSND 0007 CLAY 0030 GRVL CLAY 0042 GRVL CLAY BLDR 0046 GRVL CLAY 0070 GRVL CLAY BLDR 0080 GRVL 0081 GRVL BLDR CLAY 0094 GRVL CLAY 0095
PICKERING TOWN CON 05 015	17 653848 4863315 W	1960/08 2801	5					4601490 ()	MSND 0015 BLUE CLAY 0027 CLAY GRVL BLDR 0064 CLAY 0082 GRVL CLAY 0086 SHLE 0087
PICKERING TOWN CON 05 015	17 653840 4863353 W	1960/08 2801	2	FR 0070	-4/12/38/8:0	NU	0070 10	4601491 ()	MSND 0007 BLUE CLAY 0019 CLAY GRVL BLDR 0047 CLAY 0070 GRVL 0080 SHLE 0081
PICKERING TOWN CON 05 016	17 653515 4863123 W	1968/12 2214	30	FR 0015	15/20//:	DO		4603801 ()	LOAM 0001 CLAY SILT 0015 GRVL 0020 BRWN CLAY 0035
PICKERING TOWN CON 05 016	17 653559 4863360 W	1965/03 2610	30	FR 0018	0/20/4/1:0	CO		4601494 ()	GRVL 0012 GREY CLAY 0018 FSND 0020
PICKERING TOWN CON 05 017	17 653162 4863366 W	1995/11 6874	36	FR	5/16/10/1:30	DO		1912638 (158057)	BRWN SAND GRVL 0016
PICKERING TOWN CON 05 018	17 652714 4862789 W	2016/08 7407	6			DO		7272361 (Z216907) A	

BURNSIDE

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Appendix B

Borehole Logs

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH7-1 MW11-7-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 27, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		163.05								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 162.82				163				
		Dense to very dense moist to wet brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		0.23	1	AS	-					50 mm Dia. Monitoring Well
1					2	50 DO	50/ .08	162				
					3	50 DO	42					
2								161				Bentonite Seal
					4	50 DO	50/ .15					
3					5	50 DO	50/ .18	160				
4								159				
					6	50 DO	50/ .18					
5								158				Silica Sand Filter
6				156.85	7	50 DO	50/ .1	157				
		END OF BOREHOLE		6.20								
7												Water encountered at 4.57 m below ground surface, May 27, 2011
												Water level at a depth of 4.57 m below ground surface upon completion of drilling, May 27, 2011
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH7-2 MW11-7-2s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 27, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		144.70							
0		TOPSOIL		0.00 / 144.45							
		Wet brown CLAYEY SILT, some sand, trace gravel		0.25 / 143.94	1	AS	-	144			50 mm Dia. Monitoring Well
1		Stiff to very stiff moist to wet brown to grey CLAYEY SILT, trace to some sand, trace to some gravel (TILL)		0.76	2	50 DO	15				Bentonite Seal
					3	50 DO	12	143			
2					4	50 DO	34				
								142			
3					5	50 DO	19				
								141			Sand
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers										
					6	50 DO	15	140			
5											
								139			
6					7	50 DO	15				
								138			
7											
								137			Water encountered at a depth of 3.05 m below ground surface, May 27, 2011
8					8	50 DO	36				Water level at 3.05 m below ground surface upon completion of drilling, May 27, 2011
								136			
9					9	50 DO	13				
				135.10							
		END OF BOREHOLE		9.60							
10											

B A

Sand

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH10

SR10

PROJECT: Preliminary Geotechnical & Environmental Investigations
CLIENT: Mattamy Homes
PROJECT LOCATION: Seaton Lands, Pickering, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Mar/21/2017

REF. NO.: SP17-191-10/20
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.5 / 0.0	**TOPSOIL:** 250mm											
0.3 / 151.6	**FILL:** sandy silt, trace rootlets, dark brown, moist, loose		1	SS	6		152		○			
1 0.9 / 151.0	**CLAYEY SILT TILL:** weathered/disturbed, some sand, trace gravel, brown, moist, stiff		2	SS	9				○			
1.5 / 2 150.2	**SILTY SAND:** trace clay, greyish brown, moist, dense		3	SS	30		151		○			
2.3 / 3	**FINE SAND:** trace silt, greyish brown, moist, dense		4	SS	38		150		○			
			5	SS	40		149		○			
4 147.9												
4.6 / 5	**SANDY SILT:** trace to some clay, grey, very moist, dense		6	SS	40		148		○			0 42 47 11
6 146.4						▽		W. L. 147.2 m Apr 05, 2017				
6.1 / 7	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble/boulder, grey, moist, hard		7	SS	50/ 100mm		146		○			
8 144.3			8	SS	50/ 100mm		145		○			
8.2	**END OF BOREHOLE** Notes: 1) Monitoring well installed in the borehole upon completion. 2) Water level in monitoring well at 5.3m on Apr 05, 2017.											

SPCL SOIL LOG SP17-191-10- MATTAMY SEATON.GPJ SPCL.GDT 4/26/17

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon}$=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH11

SR11

PROJECT: Preliminary Geotechnical & Environmental Investigations
CLIENT: Mattamy Homes
PROJECT LOCATION: Seaton Lands, Pickering, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Oct/20/2016

REF. NO.: SP17-191-10/20
ENCL NO.: 12

SOIL PROFILE			SAMPLES															
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
154.7																		
154.6 0.0	**TOPSOIL:** 250mm																	
0.3	**FILL:** sandy silt, trace rootlets, trace clay, dark brown, moist, loose (possibly weathered/disturbed native)		1	SS	5													
153.8 0.9	**CLAYEY SILT TILL:** weathered/disturbed, trace gravel, brown, moist, stiff		2	SS	14		154											
153.2 1.5	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff to hard		3	SS	27		153									4	37	36	23
			4	SS	27		152												
			5	SS	30		151												
			6	SS	35		150												
							149												
			7	SS	36		148												
147.0 7.7	layer of sandy silt at 7.6m **SAND AND GRAVEL:** trace silt, brown, moist, very dense		8	SS	50/ 100mm		147											
146.4 8.3	**END OF BOREHOLE** Notes: 1) Borehole dry on completion.																	

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

RECORD OF BOREHOLE 30-1

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS
166.9		Ground Surface						
166.6	0	**Topsoil**						
166.1		rusty brown **Ploughed Silty Fine Sand Fill** some organic stains, damp		1	SS	30	7	
165.6	1	brown **Silty Sand/Sandy Silt** occ. gravel damp, compact		2	SS	20	18	
		brown **Silty Sand/Sandy Silt Till** some clay, occ. oxidized fissures damp, hard		3	SS	23	36	
	2			4	SS	20	38	
	3			5	SS	23	46	
162.9	4	brown **Silty Sand** occ. gravel damp, very dense		6	SS	8	50/8cm	
162.1		**End of Borehole**						
	5	Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry Measured Groundwater Level in Standpipe Piezometer on: January 17, 2018: Dry January 25, 2018: Dry						
	6							
	7							

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH kPa (20 40 60 80 100)

WATER CONTENT (%) (5 15 25 35)

WATER CONTENT (%)
28
11
9
10
9
11
5

MONITORING WELL

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Ground surface was frozen during the fieldwork.

Gradation Analysis, S(3):
9 38 38 15

RECORD OF BOREHOLE 30-1-A

Project No.: T19767 | CLIENT: Seaton TFMP Inc. | ORIGINATED BY: N.S.

DATE: July 17, 2019 | LOCATION: Seaton Lands, Pickering, ON | COMPILED BY: R.H.

DATUM: Geodetic | BOREHOLE TYPE: Solid Stem Augers | CHECKED BY: H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
166.9		Ground Surface										
	0	**Refer to BH 30-1**										Nearest proposed road centreline @ ~ El. 166.6m
	1											
	2											
	3											
	4											Gradation Analysis S(1): 16 64 20
162.3		brown **Silty Sand Till** occ. oxidized fissures damp, very dense		1	SS	43	95/28			6	July 29, 2019	
	5			2	SS	3	50/3	July 17, 2019		5		Possible Cobble/Boulder
161.0												
	6	light grey **Silty Sand/Sandy Silt Till** trace clay moist, very dense		3	SS	15	50/8			12		Lowest Proposed Pipe Invert @ ~El. 160.8m
160.5		**End of Borehole** Cave-In Depth on Completion: None Groundwater Depth on Completion: 6.0m										Gradation Analysis S(3): 17 40 39 4
	7	Measured Groundwater Level in Installed Monitoring Well On: July 29, 2019: 4.8m August 6, 2019: 5.0 m										
159.5												

RECORD OF BOREHOLE 30-2

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
158.8		Ground Surface										
158.5	0	**Topsoil**								20		Ground surface was frozen during the fieldwork.
		dark rusty brown **Ploughed Silty Fine Sand Fill** some organic stains, some topsoil damp		1	SS	41	6			15		
	1			2	SS	30	8			9		
157.4		brown **Silty Sand/Sandy Silt Till** some clay occ. oxidized fissures damp, hard		3	SS	25	34			8		
	2			4	SS	10	50/13cm			7		
	3			5	SS	10	50/13cm			7		
	4			6	SS	8	50/13cm			4		
154.0		**End of Borehole** Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	5											
	6											
	7											

RECORD OF BOREHOLE 30-3

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
160.9		Ground Surface										
160.5	0	**Topsoil**		1	SS	41	8			24		Ground surface was frozen during the fieldwork.
160.2		dark brown, occ. rusty brown **Ploughed Silty Sand Fill** some gravel, organic stains, damp										
159.8	1	brown **Sandy Silt Till** some clay, occ. oxidized fissures damp, very stiff		2	SS	35	19			19		
		compact brown										
159.2		**Silty Fine Sand Till** damp, dense		3	SS	38	40			9		
	2	brown **Silty Sand/Sandy Silt Till** some clay, occ. oxidized fissures damp, hard		4	SS	25	71/18cm			7		
	3			5	SS	8	50/13cm			4		
	4	grey										
156.1				6	SS	18	50/8cm			7		
	5	**End of Borehole** Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	6											
	7											

RECORD OF BOREHOLE 30-3-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
160.8		Ground Surface										
	0	**Refer to BH 30-3**										Nearest Proposed Road Centreline @~ El. 159m
	1											
	2											
	3											
	4											
156.2		grey **Silty Sand/Sandy Silt Till** some clay damp, hard		1	SS	28	50/13			6		Gradation Analysis S(1): 5 39 44 12
	5							July 17, 2019				
				2	SS	46	87			6		
154.8	6	grey **Clayey Silt Till** trace to some sand damp, hard		3	SS	46	73			6		
				4	SS	25	50/10			7		Lowest Proposed Pipe Invert @ ~El. 154m
	7											

RECORD OF BOREHOLE 30-3-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
153.3		**Silty Sand/Sandy Silt Till** moist, very dense										
152.9				5	SS	25	50/13			7		
	8	**End of Borehole** Cave-In-Depth on Completion: None Groundwater Depth on Completion: 5.5m										
	9											
	10											
	11											
	12											
	13											
	14											
145.9												

RECORD OF BOREHOLE 30-4

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
158.8		Ground Surface										
158.5	0	**Topsoil**								21		Ground surface was frozen during the fieldwork.
		dark brown **Ploughed Silty Sand Fill** some gravel, organic stains, damp		1	SS	38	9			15		
157.7	1	clayey silt fill		2	SS	35	16			12		
		very stiff										
		brown **Sandy Silt Till** some clay occ. oxidised fissures damp, hard		3	SS	41	32			11		Gradation Analysis, S(3): 6 29 40 25
	2	damp to moist, very stiff		4	SS	35	20			10		
	3	trace sand seams, damp		5	SS	30	23			13		
	4											
153.8		hard		6	SS	20	58			10		
	5	**End of Borehole**										
		Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	6											
	7											

RECORD OF BOREHOLE 30-5

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS
156.9		Ground Surface						
156.6	0	**Topsoil**		1	SS	33	5	
156.3		rusty brown **Ploughed Silty Sand Fill** occ. organic stains, damp						
	1	brown **Silty Sand/Sandy Silt Till** some clay occ. oxidized fissures damp, stiff		2	SS	35	10	
		occ. gravel, very stiff		3	SS	35	22	
	2	trace sand seams, hard		4	SS	38	40	
	3			5	SS	18	50/13cm	
152.1				6	SS	15	50/13cm	
	5	**End of Borehole** Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry Measured Groundwater Level in Standpipe Piezometer on: January 17, 2018: 1.2m January 25, 2018: 1.1m						
	6							
	7							

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa 20 40 60 80 100

WATER CONTENT (%) 5 15 25 35

WATER CONTENT values: 30, 19, 12, 12, 9, 12, 6

MONITORING WELL

January 17, 2018

January 25, 2018

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Ground surface was frozen during the fieldwork.

Gradation Analysis, S(3): 7 36 35 22

Gradation Analysis, S(6): 14 37 30 19

RECORD OF BOREHOLE 30-5-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS
156.9	0	Ground Surface						
		Refer to BH 30-5						
152.3	4	brown **Silty Sand/Sandy Silt Till** some clay occ. oxidized fissures damp, hard		1	SS	46	76	July 17, 2019
	5			2	SS	5	50/8	
151.3	6	**End of Borehole** Cave-In-Depth on Completion: None Groundwater Depth on Completion: 4.6m Measured Groundwater Level in Installed Monitoring Well on: July 29, 2019: 2.1m August 6, 2019: 2.2 m						
149.5	7							

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH kPa (20 40 60 80 100)

WATER CONTENT (%) (5 15 25 35)

7

6

MONITORING WELL

July 29, 2019

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Nearest Proposed Road Centreline @ ~El. 157.6m

Possible cobble/boulder

Lowest Proposed Pipe Invert @ ~El. 151.6m

RECORD OF BOREHOLE 30-6

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
155.8		Ground Surface										
155.4	0	**Topsoil**		1	SS	41	7			30		Ground surface was frozen during the fieldwork.
154.9		mottled brown to dark brown **Ploughed Silty Sand/Sandy Silt Fill** some organic stains, trace topsoil damp								13		
	1	stiff, moist		2	SS	30	10			9		
		brown **Clayey Silt** damp, very stiff		3	SS	25	16			16		Gradation Analysis & Atterberg Limits, (S3): 3 21 43 33 LL : 27% PL : 16% PI : 11%
153.7	2	brown **Sandy Silt Till** some clay, occ. gravel fragments occ. oxidized fissures damp, very stiff		4	SS	10	25			10		
	3			5	SS	10	25			9		
151.8	4	brown **Sandy Silt Till** occ. oxidized fissures damp, very dense		6	SS	8	50/13cm			9		
151.0		**End of Borehole**										
	5	Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	6											
	7											

RECORD OF BOREHOLE 30-6-A

Project No.: T19767 CLIENT: Seaton TFMP Inc. ORIGINATED BY: N.S.

DATE: July 17, 2019 LOCATION: Seaton Lands, Pickering, ON COMPILED BY: R.H.

DATUM: Geodetic BOREHOLE TYPE: Solid Stem Augers CHECKED BY: H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
155.8		Ground Surface										
	0	**Refer to BH 30-6**										Nearest Proposed Road Centreline @ ~El. 155.9m
	1											
	2											
	3											
	4							July 17, 2019				
151.2		brown **Silty Sand/Sandy Silt Till** trace clay some sand seams damp, very dense		1	SS	41	88/2			10		Gradation Analysis S(1): 8 39 47 6
	5	damp to moist		2	SS	25	50/			7 7		
149.7	6	grey										Lowest Proposed Pipe Invert @ ~El. 150m
149.1		grey **Silty Sand Till** moist, very dense		3	SS	46	84			8		
	7	brown **Silty Sand/Sandy Silt Till** trace clay damp, very dense		4	SS	46	95			9		
148.5												

RECORD OF BOREHOLE 30-6-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS				
		End of Borehole Cave-In-Depth on Completion: None Groundwater Depth on Completion: 4.6m										
	8											
	9											
	10											
	11											
	12											
	13											
	14											

RECORD OF BOREHOLE 30-6-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS				
140.8		**End of Borehole**										
	15	Cave-In-Depth on Completion: None Groundwater Depth on Completion: 4.6m										
	16											
	17											
	18											
	19											
	20											
	21											
	22											

RECORD OF BOREHOLE 30-7

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
154.0		Ground Surface										
153.7	0	**Topsoil**								24		Ground surface was frozen during the fieldwork.
		mottled brown to dark brown **Ploughed Silty Sand/Sandy Silt Fill** some organic stains, trace topsoil damp		1	SS	50	10			15		
153.1												
	1	brown **Silty Sand/Sandy Silt Till** some clay damp, stiff		2	SS	30	12			12		
152.5												
		brown **Sandy Silt Till** some oxidized fissures damp, compact		3	SS	35	26			12		
	2			4	SS	41	20			6		
		trace sand seams, dense		5	SS	30	33			11		Gradation Analysis, S(5): 7 35 49 9
150.0	3											
	4	greyish brown **Sandy Silt Till** some clay, occ. oxidized fissures trace sand seams damp, very stiff		6	SS	46	18			13		
	5											
148.0				7	SS	41	20			12		
	6	**End of Borehole** Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	7											

RECORD OF BOREHOLE 30-7-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
154.0		Ground Surface										
	0	**Refer to BH 30-7**										
	1											Nearest Proposed Road Centreline @ ~El. 153.0m
	2											
	3											
	4											
	5											
147.9	6											
		greyish brown **Sandy Silt Till** some clay occ. oxidized fissures damp to moist, very stiff		1	SS	46	26			15		
147.3		greyish brown **Silty Sand/Sandy Silt Till** trace clay moist, very dense		2	SS	46	82			7		Lowest Proposed Pipe Invert @ ~El. 147m
146.7	7											

RECORD OF BOREHOLE 30-7-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS				
		End of Borehole										
		Cave-In-Depth on Completion: None Groundwater Depth on Completion: Dry										
	8											
	9											
	10											
	11											
	12											
	13											
	14											
139.1												

RECORD OF BOREHOLE 30-8

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.5		Ground Surface										
152.1	0	**Topsoil**		1	SS	41	23			29		Ground surface was frozen during the fieldwork.
151.6		dark brown **Ploughed Clayey Silt Fill** some organic stains, trace topsoil damp								24		
150.8	1	stiff, moist brown **Clayey Silt Till** damp, very stiff		2	SS	25	14			20		
	2	occ. gravel fragments brown **Sandy Silt Till** some clay damp, very stiff		3	SS	41	30			11		
				4	SS	35	30			10		
	3	trace sand seams, hard		5	SS	38	40			10		
	4	grey								9		
147.5	5			6	SS	35	44			8		
		End of Borehole Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry										
	6											
	7											

RECORD OF BOREHOLE 30-8-A

Project No.: T19767 CLIENT: Seaton TFMP Inc. ORIGINATED BY: N.S.

DATE: July 17, 2019 LOCATION: Seaton Lands, Pickering, ON COMPILED BY: R.H.

DATUM: Geodetic BOREHOLE TYPE: Solid Stem Augers CHECKED BY: H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.5		Ground Surface										
	0	**Refer to BH 30-8**										Nearest Proposed Road Centreline @ ~El. 151.7m
	1											
	2											
	3											
	4											
147.9												
	5	grey **Silty Sand/Sandy Silt Till** some clay damp to moist, hard		1	SS	46	33			8		
				2	SS	46	33			8		Gradation Analysis S(2): 4 36 45 15
	6			3	SS	46	31			9		
145.5	7			4	SS	31	50/10	July 17, 2019		9 13		Lowest Proposed Pipe Invert @ ~El. 145.7m
145.2		grey **Silty Sand/Sandy Silt Till** damp to moist, very dense										

RECORD OF BOREHOLE 30-8-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS				
		End of Borehole										
		Cave-In-Depth on Completion: None Groundwater Depth on Completion: 7.0m										
	8											
	9											
	10											
	11											
	12											
	13											
	14											
137.6												

RECORD OF BOREHOLE 30-9

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.1		Ground Surface										
150.8	0	**Topsoil**		1	SS	38	4			39		Ground surface was frozen during the fieldwork.
150.5		mottle brown to dark brown **Ploughed Clayey Sandy Silt Fill** some organic stains, damp								16		
	1	brown **Silty Sand/Sandy Silt Till** some clay occ. oxidized fissures damp, very stiff		2	SS	18	16			13		
				3	SS	35	16			12		Gradation Analysis, S(3): 8 30 47 15
	2	trace sand seams damp, hard		4	SS	41	38			12		
	3	moist to wet, fine sand seams		5	SS	28	50			14		
	4	grey		6	SS	38	42			8		Gradation Analysis, S(6): 6 32 44 18
	5	damp, very stiff		7	SS	35	28			10		
145.1	6			8	SS	35	28			9		
		End of Borehole										
	7	Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry Measured Groundwater Level in Standpipe Piezometer on: January 17, 2018: 1.4m January 25, 2018: 1.3m									January 17, 2018 January 25, 2018	

RECORD OF BOREHOLE 30-10

Project No.: T17707 **CLIENT:** Mattamy Development Corp. **ORIGINATED BY:** M.Z.

DATE: January 10, 2018 **LOCATION:** Area 30, Seaton Lands, Pickering, ON **COMPILED BY:** M.Z.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.4		Ground Surface										
151.1	0	**Topsoil**										
		dark brown **Ploughed Silty Sand Fill** organic stains, some topsoil damp to moist		1	SS	33	9			14		Ground surface was frozen during the fieldwork.
				2	SS	35	4			17 16		
150.0	1	brown **Clayey Silt Till** occ. oxidized fissures trace sand seams, damp, very stiff		3	SS	30	17			12		Gradation Analysis & Atterberg Limits S(3): 2 12 56 30 LL : 25% PL : 15% PI : 10%
149.3	2	brown **Silty Sand/Sandy Silt Till** some clay, occ. oxidized fissures occ. sand seams damp, very stiff		4	SS	25	23			9		
	3	hard		5	SS	30	24			10		Gradation Analysis, S(5): 17 30 37 16
	4	grey, very stiff		6	SS	15	44			9		
	5	hard		7	SS	35	26			9		
145.4	6	moist to wet sand seams		8	SS	35	32			9		
		End of Borehole Cave-in Depth on Completion: None Groundwater Depth on Completion: Dry Measured Groundwater Level in Standpipe Piezometer on: January 17, 2018: 1.7m January 25, 2018: 1.6m									January 17, 2018 January 25, 2018	
	7											

RECORD OF BOREHOLE 113

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
145.8		Ground Surface										
145.5	0	**Topsoil**										
		mottled brown **Clayey Sandy Silt Fill** trace to some organic stains damp		1	SS	46	11			12		
144.9												
	1	brown **Silty Clay/Clayey Silt Till** damp to moist, very stiff		2	SS	46	20			12 17		
144.4												
		brown **Clayey Sandy Silt Till** occ. oxidized fissures damp to moist, very stiff		3	SS	25	19	July 18, 2019		11		
	2											
		grey damp		4	SS	30	15			9		
	3											
		sand interbedding, moist to wet stiff		5	SS	20	12			13		
		hard										
	4			6	SS	15	50/5cm			8		
				7	SS	46	82			8		Gradation Analysis S(7): 4 39 38 19
	5											
140.2				8	SS	46	73			8 12		Proposed Bottom Invert For Potential LID @ ~El. 140m
	6	grey **Silty Sand** moist to wet, very dense		9	SS	46	65			18		Gradation Analysis S(9): 0 66 34 0
		some clay interbedding trace silty sand/sandy silt till zones		10	SS	46	74			19		
138.5	7											

RECORD OF BOREHOLE 113

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35		
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS			MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
		End of Borehole										
		Groundwater Depth on Completion: 2.1m Cave-in Depth on Completion: None										
		Measured Groundwater Level in Installed Monitoring Well On: July 29, 2019: 3.2 m August 6, 2019: 3.3 m										
	8											
	9											
	10											
	11											
	12											
	13											
	14											
131.1												

RECORD OF BOREHOLE 114

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

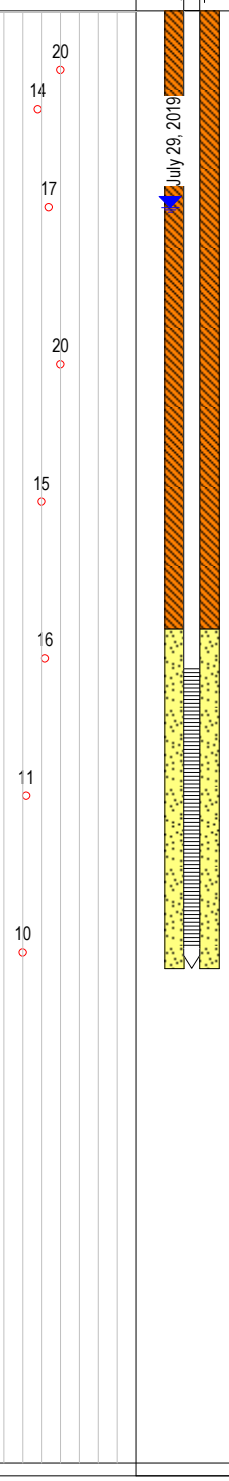
DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS
146.6		Ground Surface						
146.3	0	**Topsoil**						
		mottled brown, occ. dark brown **Sand Fill** trace topsoil, some organic stains moist		1	SS	46	4	
145.9								
	1	greyish brown **Sand** some silty sand zones occ. organic stains moist to wet, compact		2	SS	46	13	July 19, 2019
				3	SS	46	13	
144.8								
	2	grey **Clayey Silt Till** damp		4	SS	46	12	
	3			5	SS	15	15	
142.9								
	4	grey **Clayey Sandy Silt Till** damp, very stiff		6	SS	15	15	
141.6	5	**End of Borehole** Groundwater Depth on Completion: 1.2m Cave-in Depth on Completion: None Measured GroundwaterLevels in Installed Monitoring Well On: July 29, 2019: 1.0m August 6, 2019: 1.0 m		7	SS	25	24	
	6							
	7							
139.2								

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH kPa (20 40 60 80 100)

WATER CONTENT (%) (5 15 25 35)



MONITORING WELL

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Proposed SWMP Bottom Invert @ ~El. 144.0m

Gradation Analysis S(4):
4 15 60 21
LL: 21%
PL: 14%
PI: 7%

Gradation Analysis S(6):
9 32 44 15

Gradation Analysis S(7):
6 38 40 16

RECORD OF BOREHOLE 115

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
148.9		Ground Surface										
148.6	0	**Topsoil**		1	SS	46	17			9, 11		
148.2		brown, occ. mottled brown **Sandy Silt Till** some organic stains damp, very stiff										
	1	brown, occ. reddish brown **Silty Sand Till** moist to wet, compact		2	SS	25	11			18		
		some sand zones moist		3	SS	41	26	July 19, 2019		10		
146.8	2	brown **Silty Sand/Sandy Silt Till** trace clay some oxidized fissures damp to moist, compact		4	SS	46	24			10	July 29, 2019	
	3	dense		5	SS	20	43			12		Cobble/Boulder
	4	grey, compact		6	SS	46	27			9		Gradation Analysis S(6): 4 40 50 6
	5	some clay		7	SS	46	27			10		Proposed SWMP Bottom Invert @ ~El. 144.0m
142.4	6	silty sand interbedding, wet		8	SS	46	16			19		
		grey **Clayey Sandy Silt Till** moist, very stiff										
141.7	7			9	SS	30	28			16		

RECORD OF BOREHOLE 115

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
		reddish grey **Sandy Silt** some clay moist to wet, compact										
140.8	8			10	SS	25	25			19		
		End of Borehole Groundwater Depth on Completion: 2.1m Cave-in Depth on Completion: None Measured Groundwater Level in Installed Monitoring Well On: July 29, 2019: 2.6m August 6, 2019: 2.7 m										
	9											
	10											
	11											
	12											
	13											
	14											
134.2												

RECORD OF BOREHOLE 116

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
149.2		Ground Surface										
148.9	0	**Topsoil**										
		mottled brown **Silty Sand/Sandy Silt Fill** trace sand, trace rootlets some organic stains damp		1	SS	46	5			19, 13		
148.5												
	1	light brown **Silty Clay/Clayey Silt Till** moist, stiff		2	SS	46	12			20		
147.8		brown **Clayey Silty Sand/Sandy Silt Till** occ. oxidized fissures damp, stiff		3	SS	46	14			12		
	2	some oxidized fissures, hard		4	SS	46	37			10		Gradation Analysis S(6): 17 32 25 26
	3	damp to moist		5	SS	46	42	July 22, 2019		13		Practical Auger Refusal on Possible Cobble/Boulder @ ~ 3.1m below existing grade. Borehole location moved 2m north.
	4	damp, very stiff		6	SS	25	24			10		Practical Auger Refusal on Possible Cobble/Boulder @ ~ 4.4m below existing grade. Borehole locaion moved 5m north.
	5	grey hard		7	SS	46	31			9		Gradation Analysis S(8): 6 35 46 13
				8	SS	30	26			10		Proposed SWMP Bottom Invert @ ~El. 144.0.
	6	moist, very stiff		9	SS	46	23			10	July 29, 2019	Practical Auger Refusal on Possible Cobble/Boulder @ ~ 4.6m below existing grade. Borehole locaion moved 6m northwest.
142.5												
	7	grey **Silty Sand/Sandy Silt Till** occ. wet sand pockets moist		10	SS	25	*			12		* Sample distributed due to wet sand pocket.

RECORD OF BOREHOLE 116

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
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Vaughan, Ontario, L4K 2Z6

SOIL PROFILE				SAMPLES					DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	" N " VALUES	GROUND WATER CONDITIONS				
				11	SS	20	*			18		
141.1	8	**End of Borehole** Groundwater Depth on Completion: 3.4m cave-in Depth on Completion: 6.4m Measured Groundwater Level in Installed Monitoring Well On: July 29, 2019: 1.8m August 6, 2019: 1.9 m										
	9											
	10											
	11											
	12											
	13											
	14											

RECORD OF BOREHOLE 117

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
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ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
144.5		Ground Surface										
144.2	0	**Topsoil**		1	SS	46	14			9		
143.8		brown **Silty Clay/Clayey Silt Fill** some sand, trace rootlets some organic stains damp								14		
	1	occ. organic stains moist, loose		2	SS	46	9			27		
		brown **Silty Sand/Sandy Silt Till** trace clay damp to moist, compact		3	SS	46	19			10		
	2	occ. oxidized fissures		4	SS	46	28			11		
	3	grey		5	SS	46	28			10		
	4			6	SS	46	16			10		
	5			7	SS	46	15			10		
				8	SS	46	16			10		
	6	moist		9	SS	30	11			13		
137.9	7	**End of Borehole** Groundwater Depth on Completion: Dry Cave-in Depth on Completion: None Measured Groundwater Level In Installed Monitoring Well on: July 29, 2019: 1.3m August 6, 2019: 1.4 m									July 29, 2019	Proposed Bottom Invert for Potential LID @ ~El. 140.0m Gradation Analysis S(7): 4 46 46 4

RECORD OF BOREHOLE G7-1-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
83 Citation Dr, Unit 9,
Vaughan, Ontario, L4K 2Z6

ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
162.4		Ground Surface										
	0	**Refer to BH G7-1**										
	1											
	2											
	3											Nearest Proposed Road Centreline @ ~El. 159.4m
	4											
	5											
156.3	6											
		brown **Sandy Silt/Silty Sand Till** occ. oxidized fissures damp to moist, very dense		1	SS	46	66			8		
	7			2	SS	5	50/10			9		

RECORD OF BOREHOLE G7-1-A

Project No.: T19767 **CLIENT:** Seaton TFMP Inc. **ORIGINATED BY:** N.S.

DATE: July 17, 2019 **LOCATION:** Seaton Lands, Pickering, ON **COMPILED BY:** R.H.

DATUM: Geodetic **BOREHOLE TYPE:** Solid Stem Augers **CHECKED BY:** H.S.

SHAD & ASSOCIATES INC.
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ELEVATION (metres)	DEPTH SCALE (metres)	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	RECOVERY (cm)	"N" VALUES	GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa 20 40 60 80 100	WATER CONTENT (%) 5 15 25 35	MONITORING WELL	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	8	trace clay		3	SS	46	48			9		Gradation Analysis S(3): 8 48 38 6
154.2		brown **Silty Sand Till** damp to moist, very dense		4	SS	20	50/8			5		
	9	some clay		5	SS	46	75			10		Lowest Proposed Pipe Invert @ ~El. 153.4m
152.8		**End of Borehole**										
	10	Cave-In-Depth on Completion: None Groundwater Depth on Completion: Dry										
		Measured Groundwater Level in Installed Monitoring Well On: July 29, 2019 : Dry August 6, 2019: Dry										
	11											
	12											
	13											
	14											

BURNSIDE

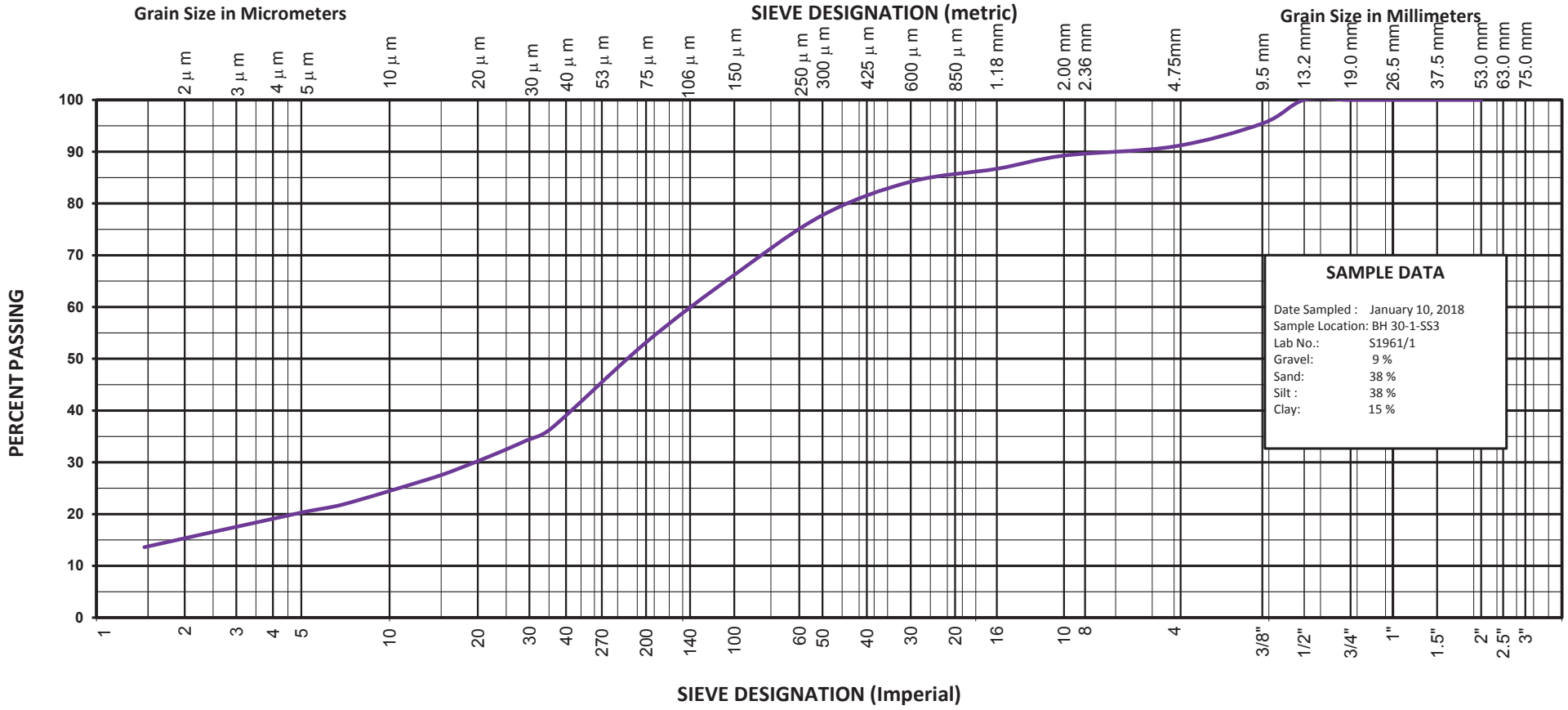
[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Grainsize Analysis

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



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SHAD & ASSOCIATES INC.

GRAIN SIZE ANALYSIS

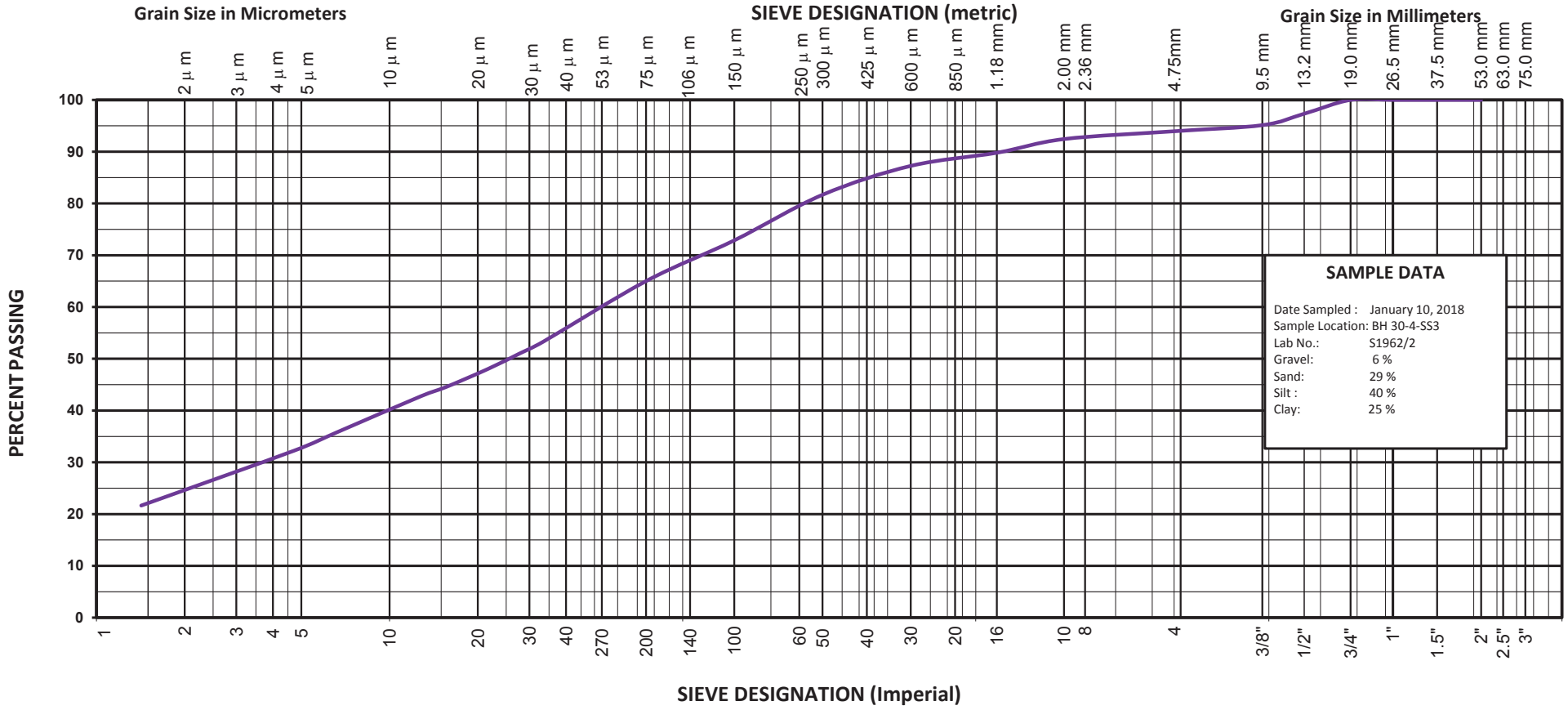
Project : Seaton Lands- Area 30

Project No.: T17707

Client: Mattamy Development Corporation

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



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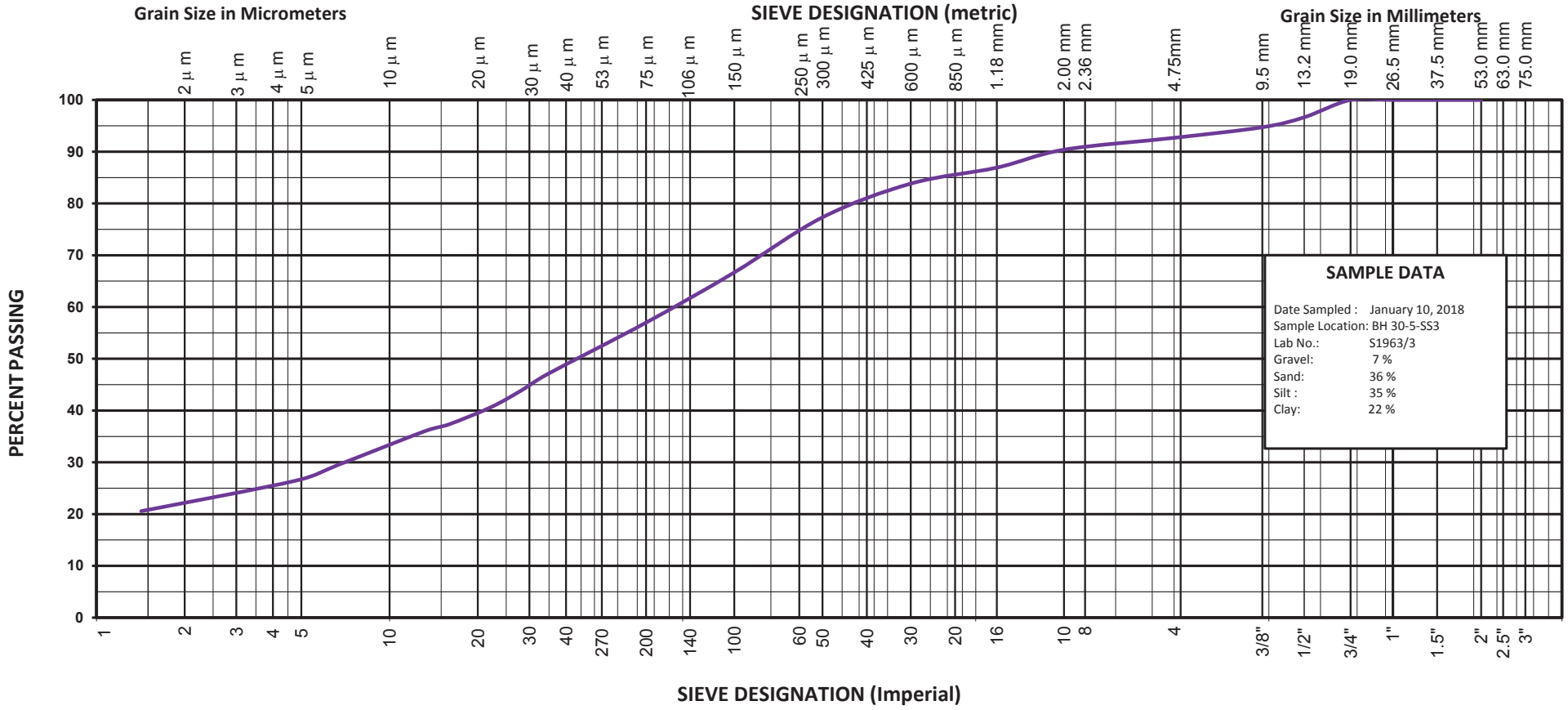

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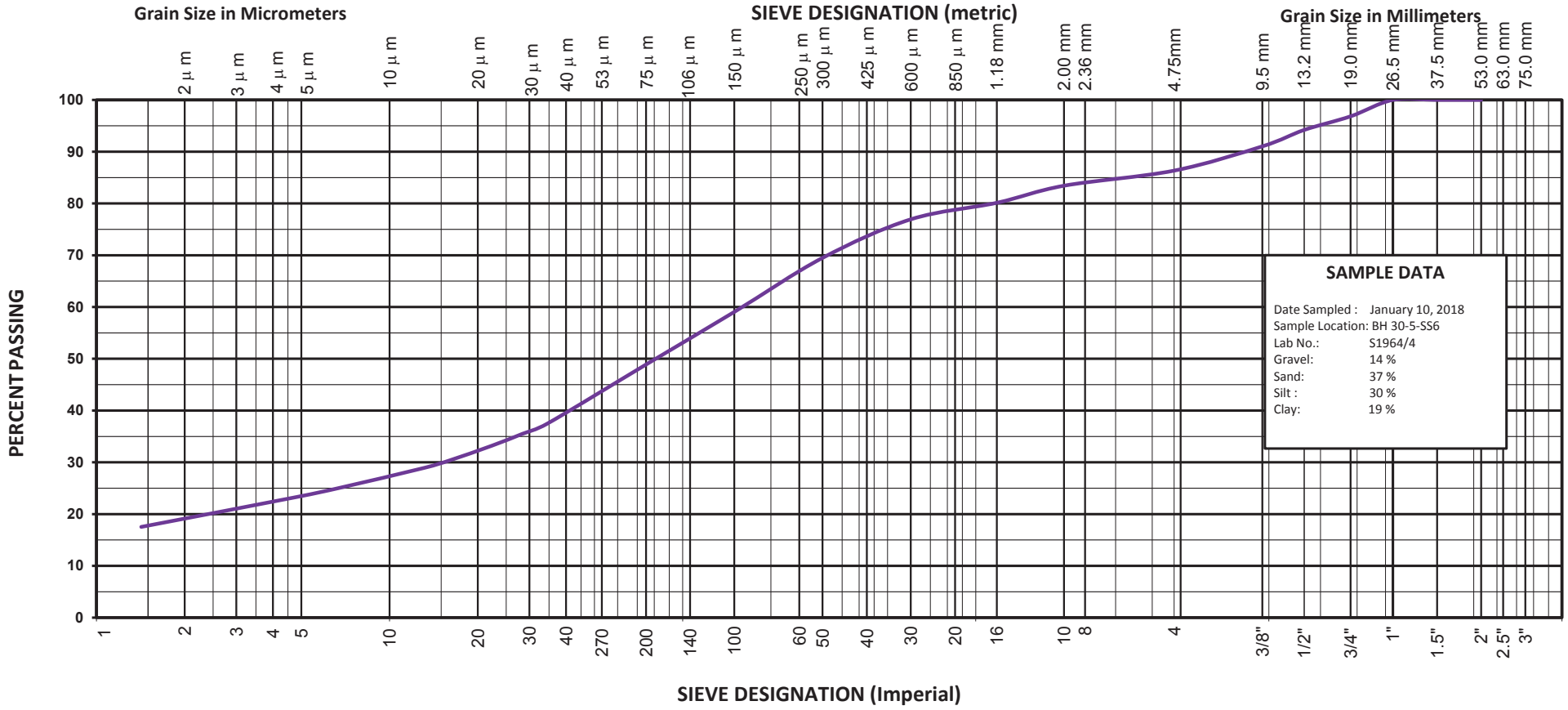

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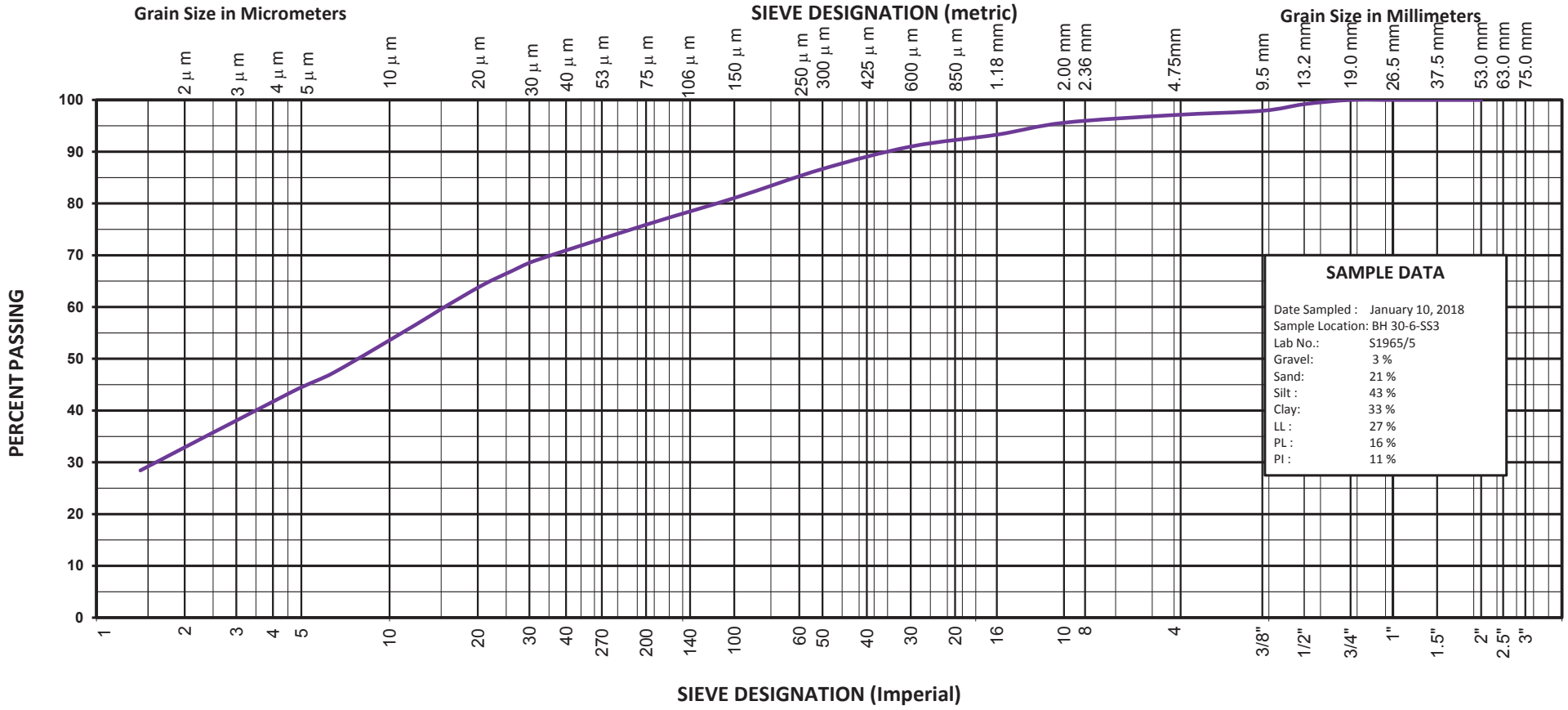

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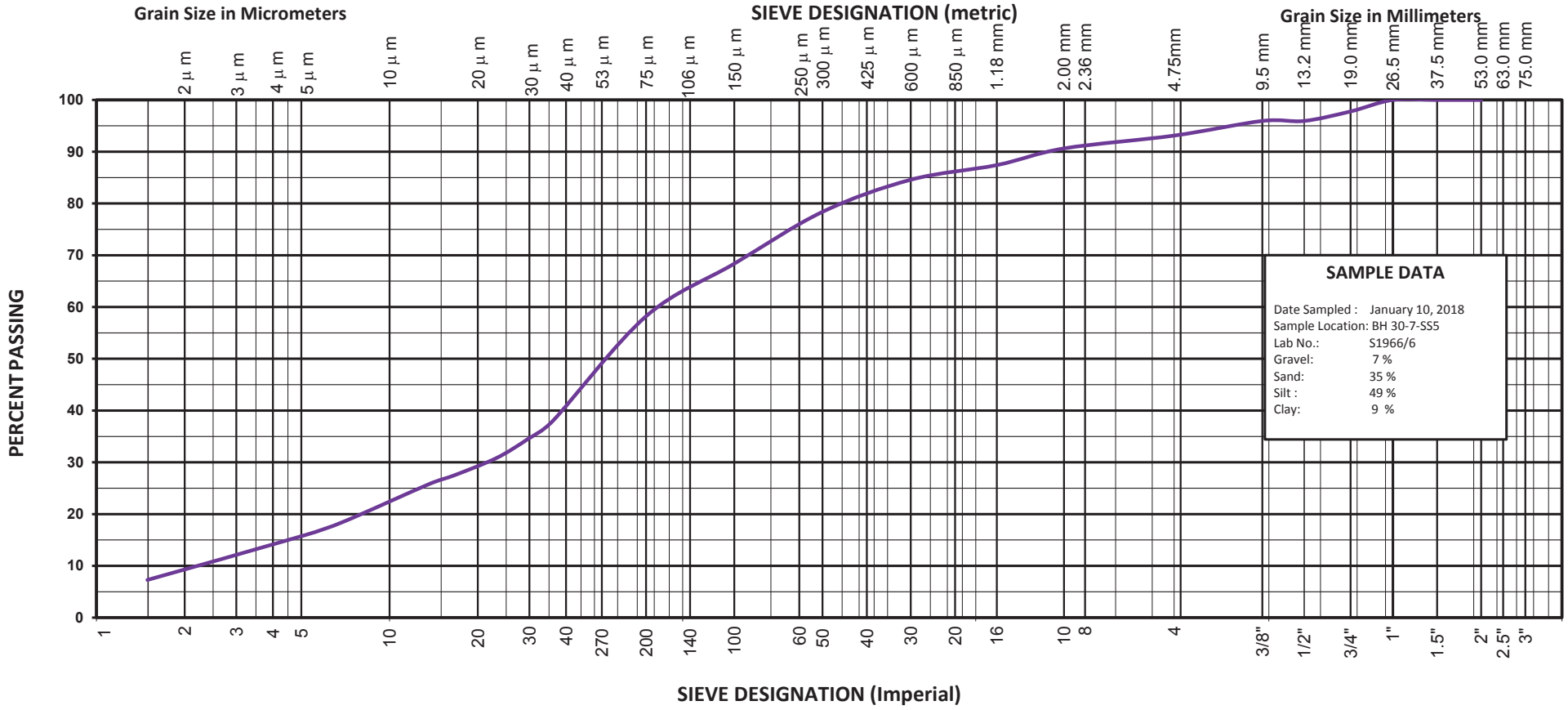

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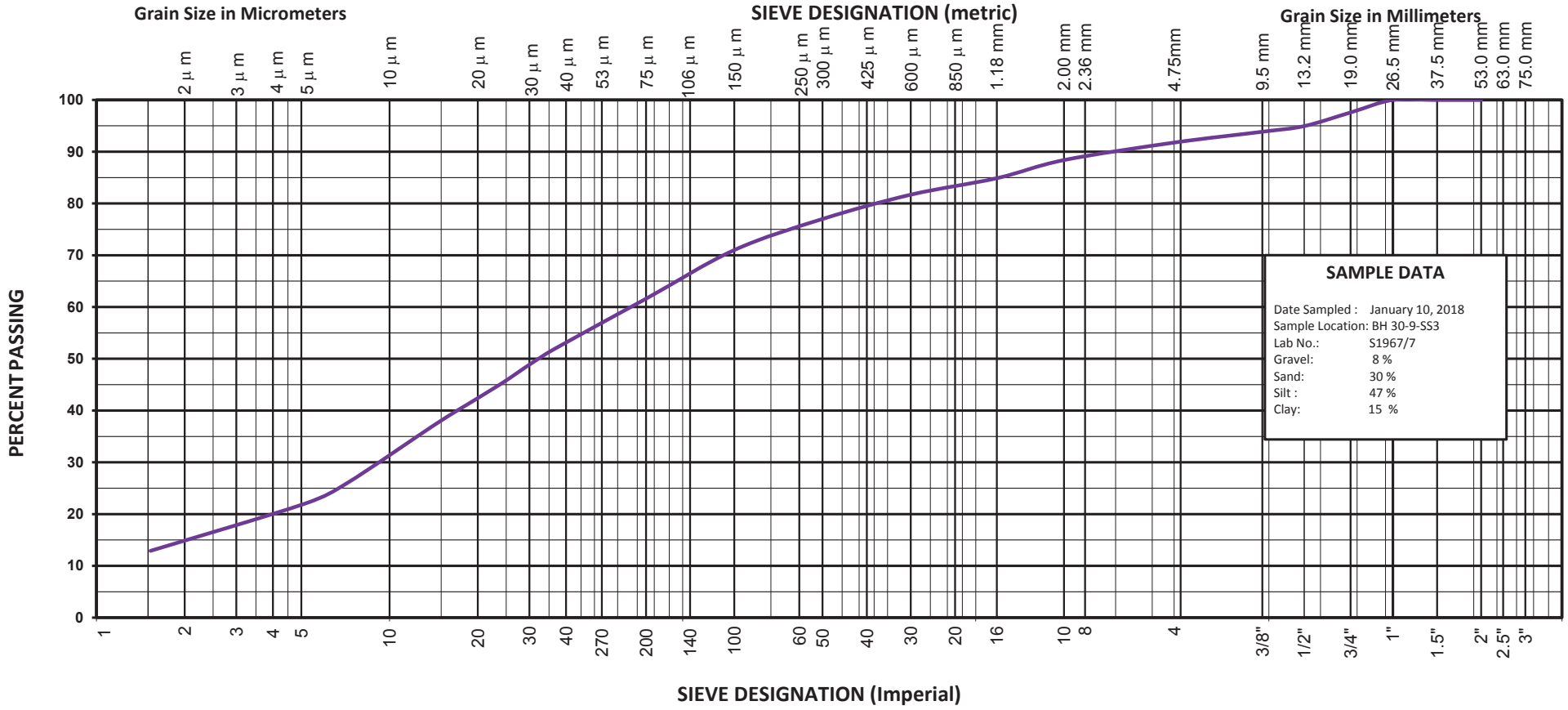

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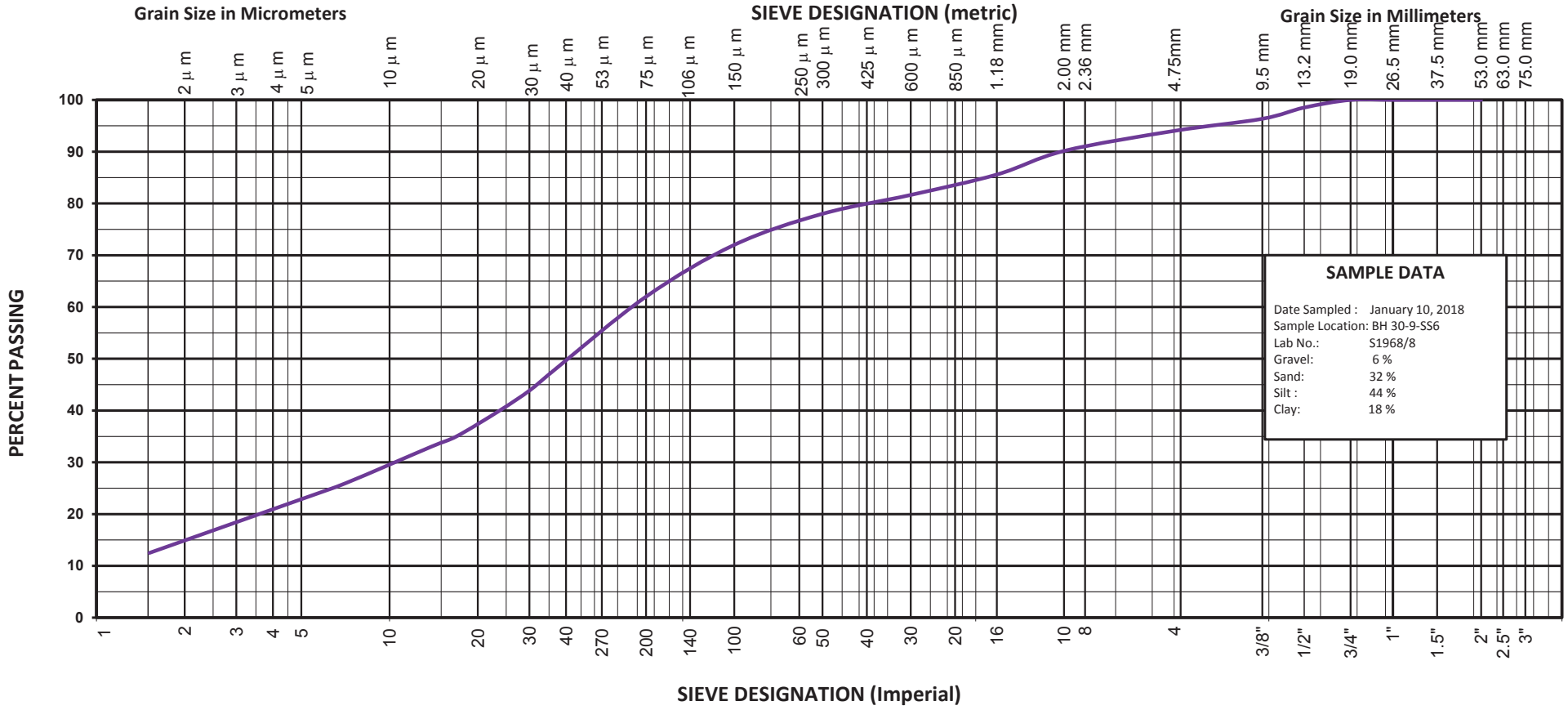

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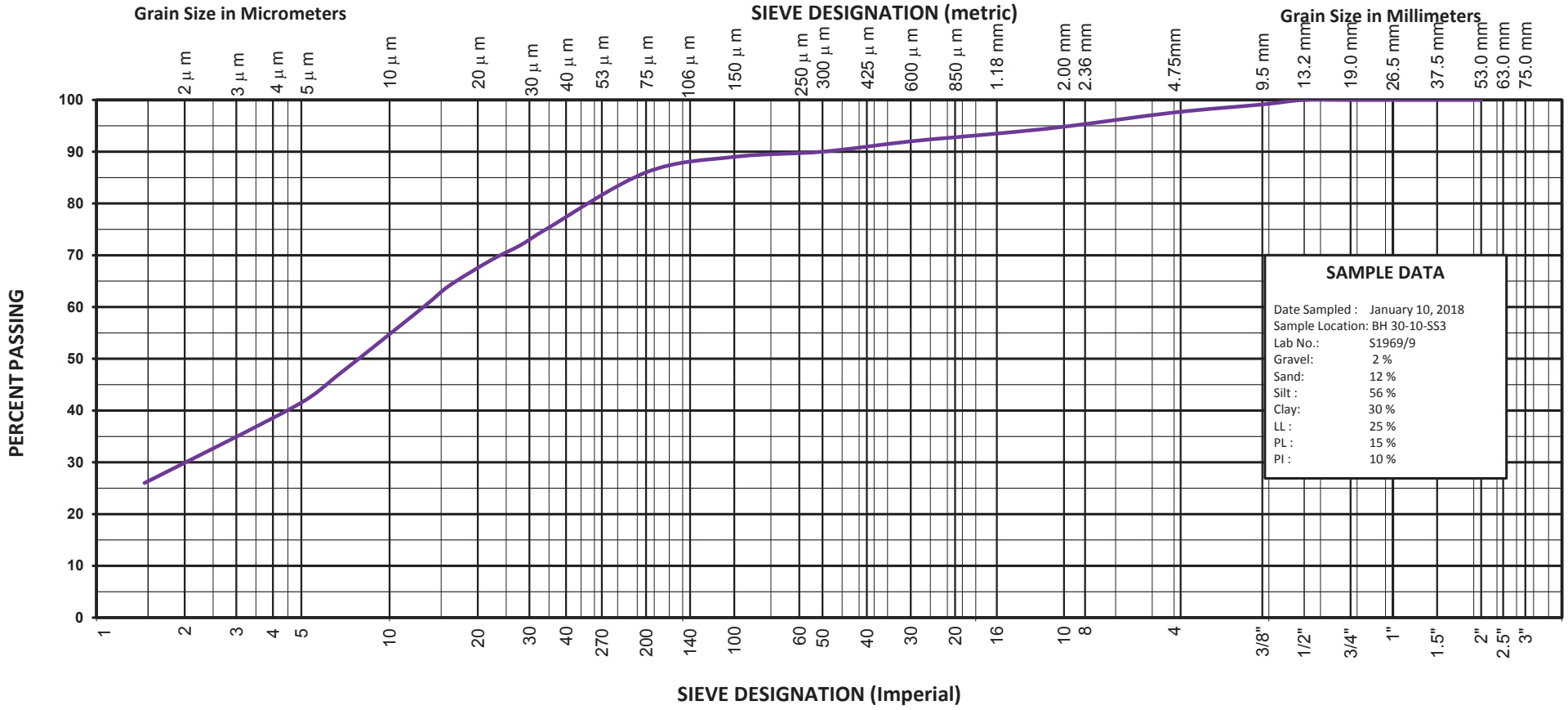

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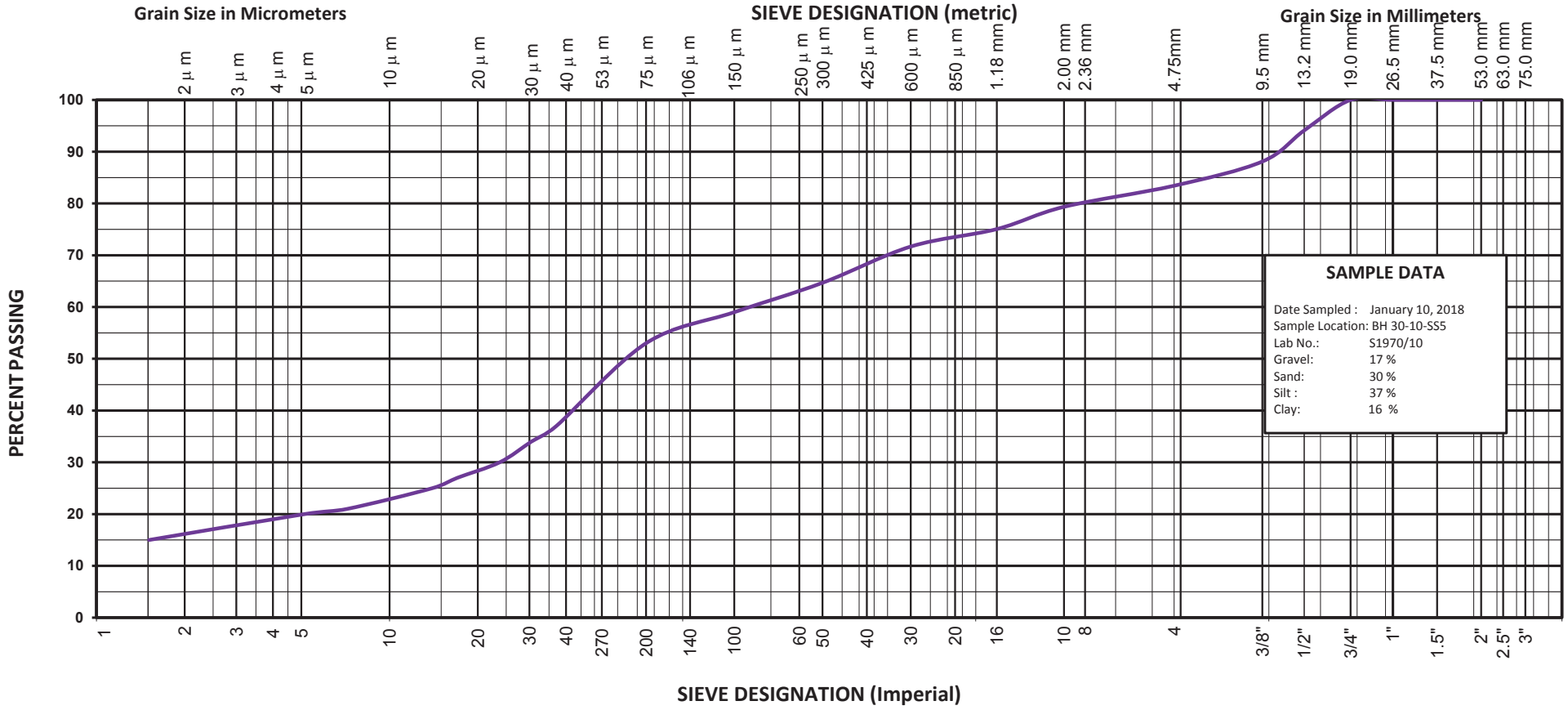

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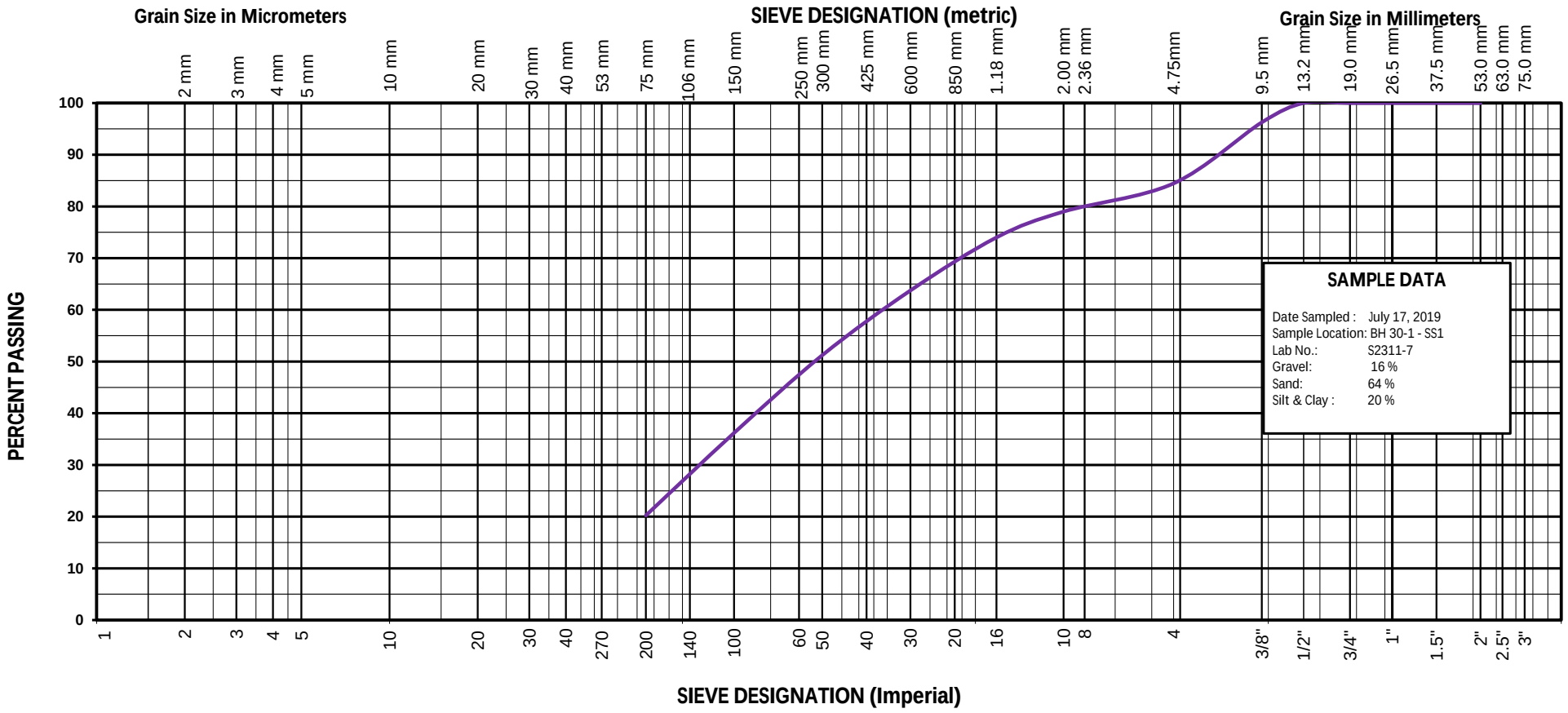

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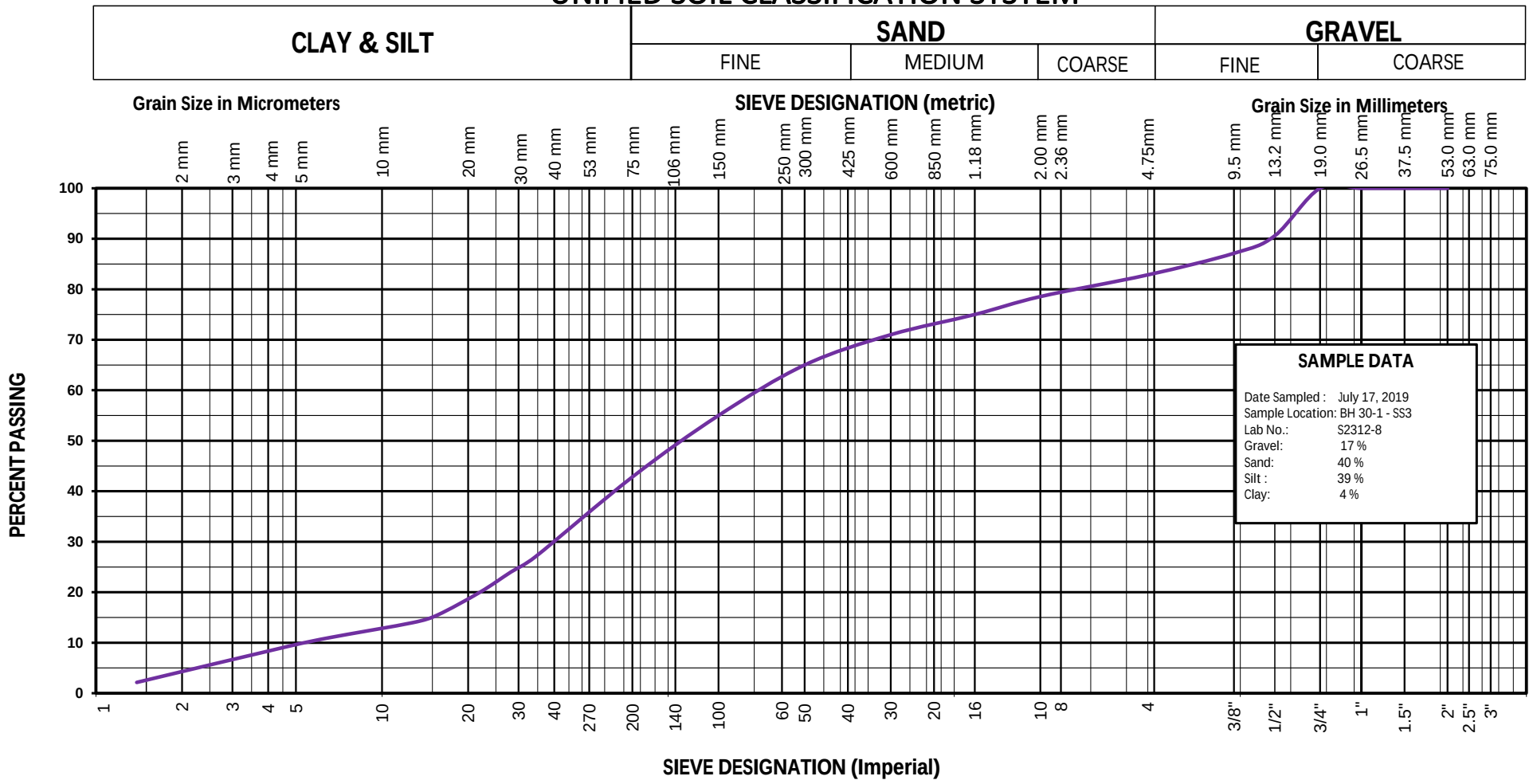

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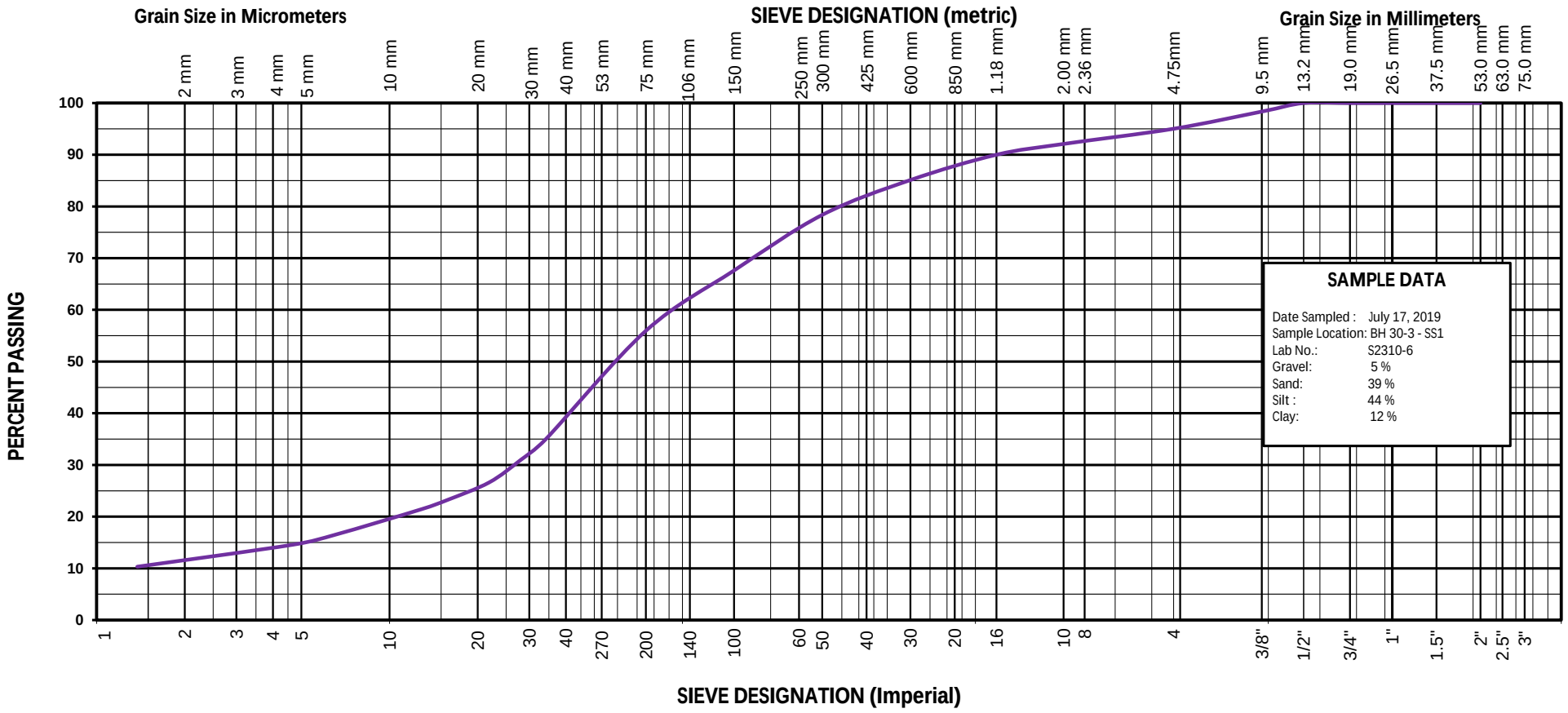

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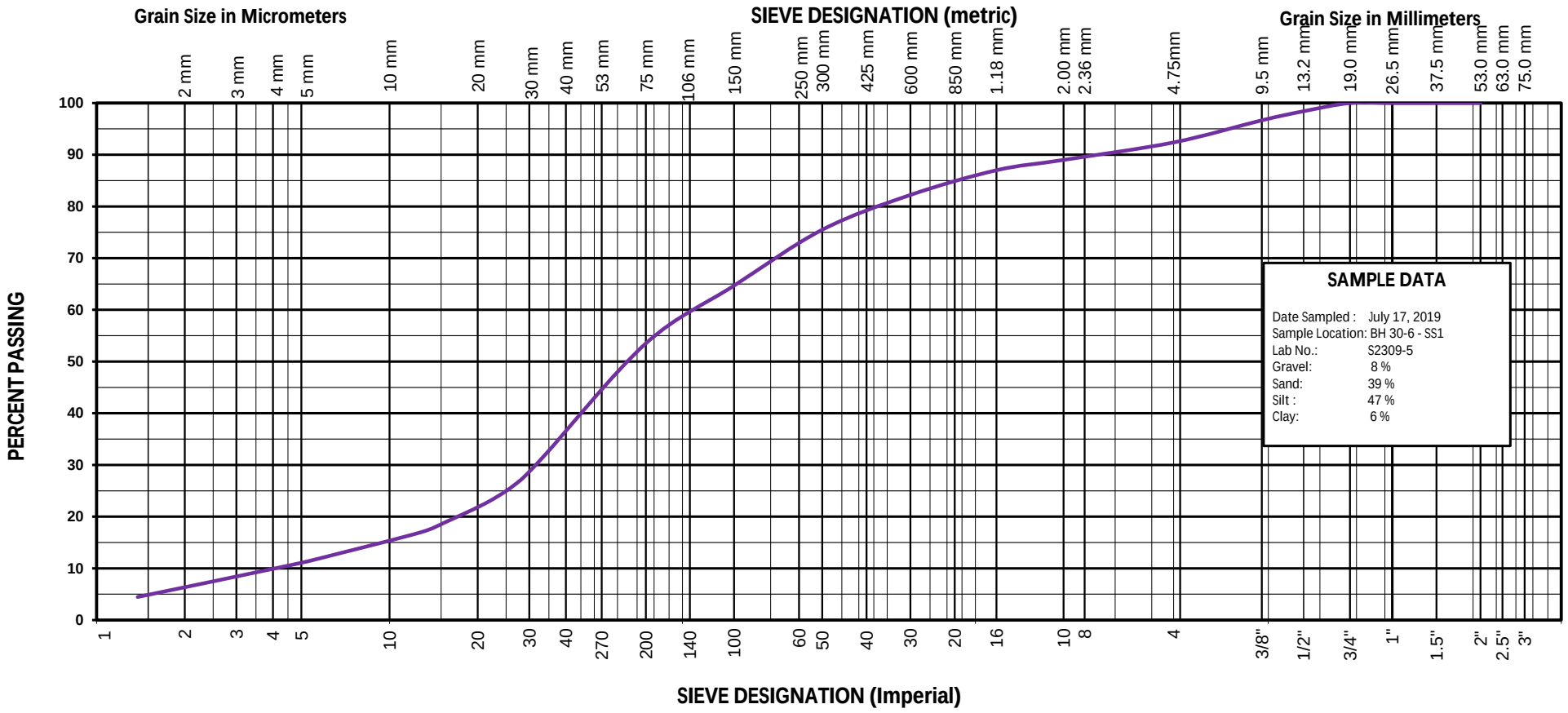

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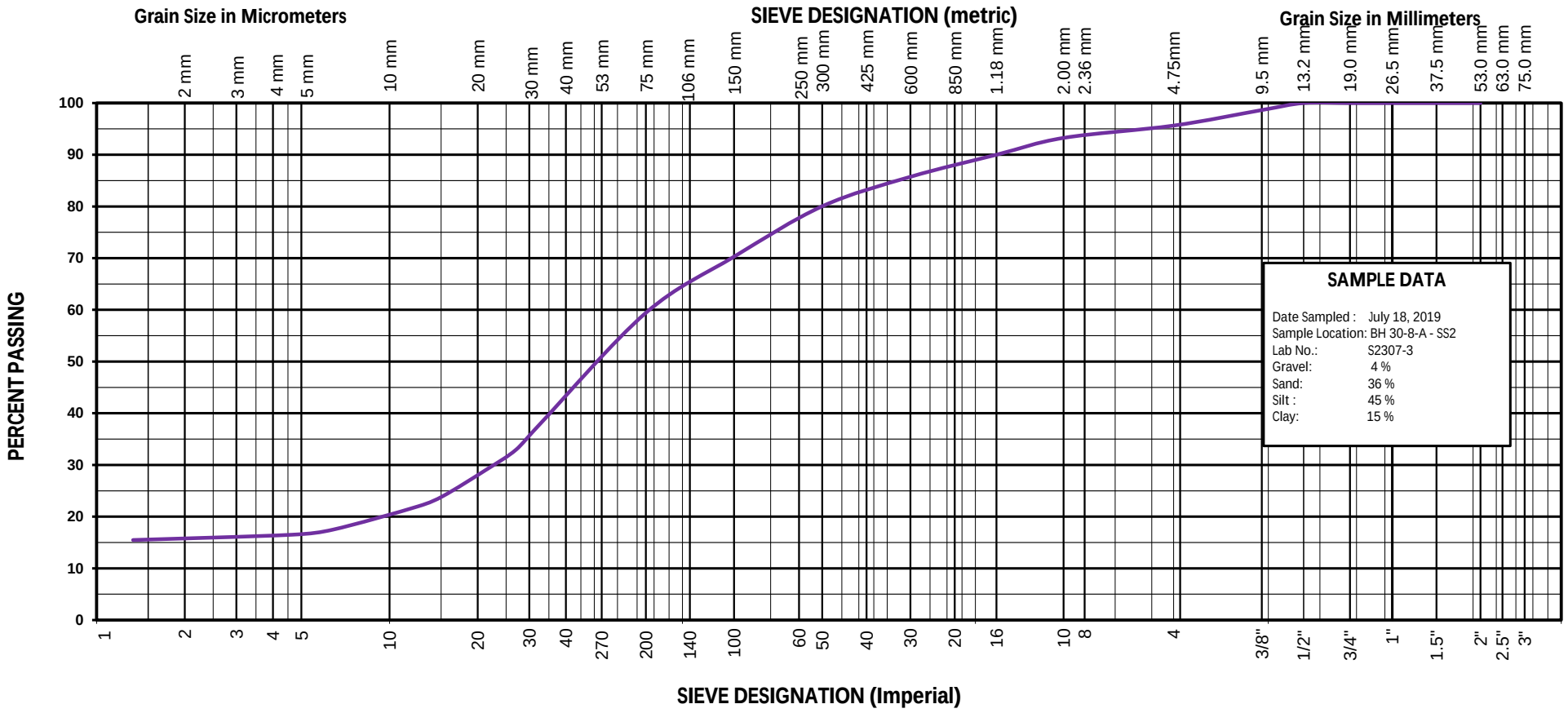

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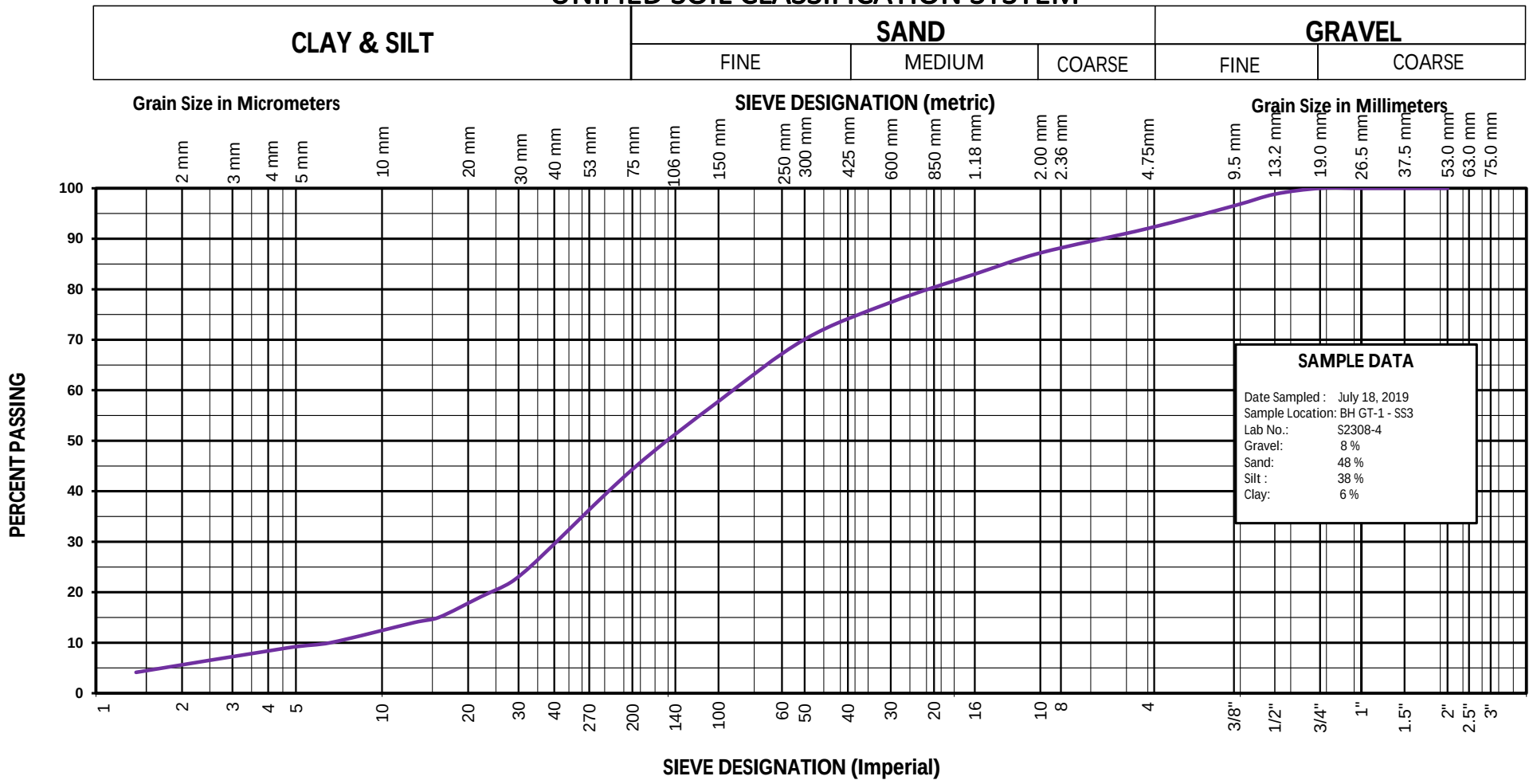

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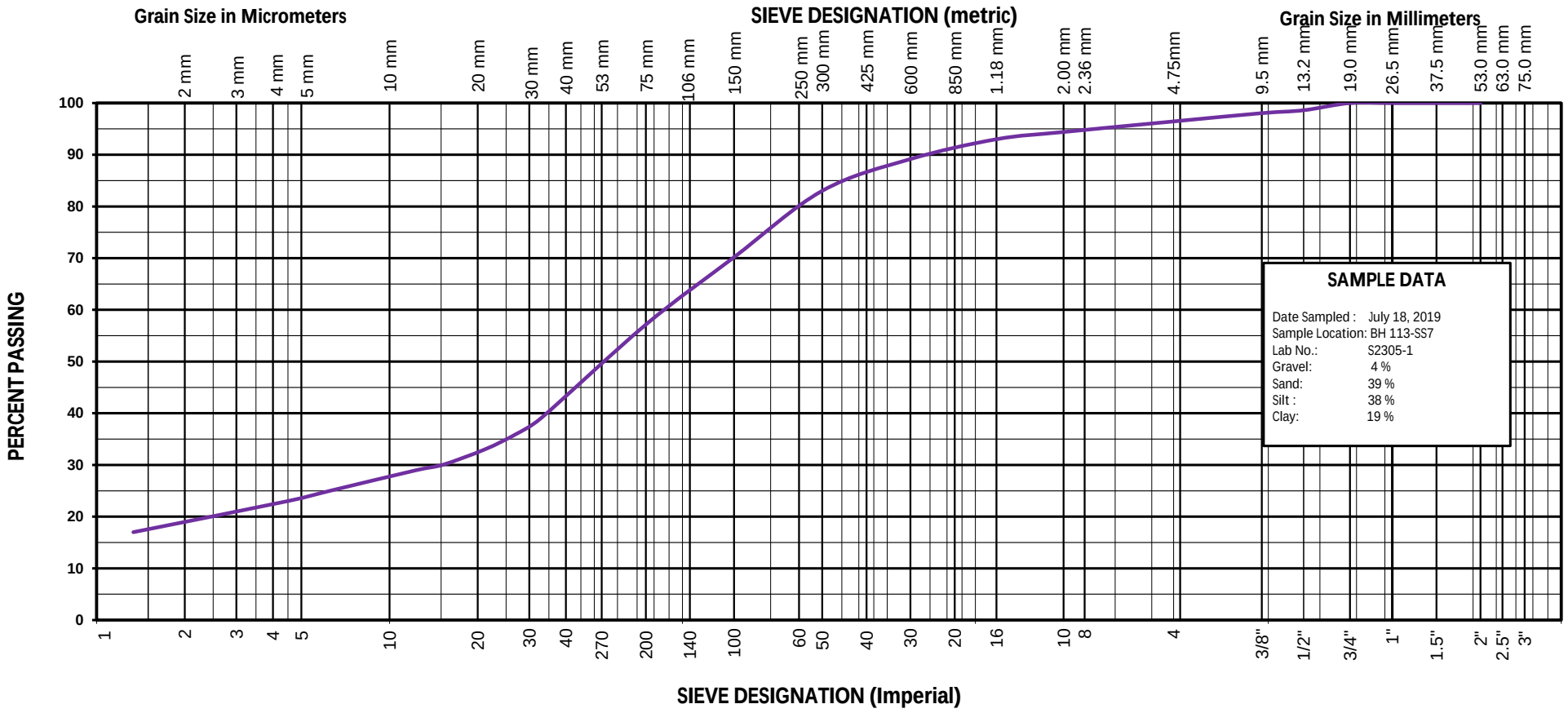

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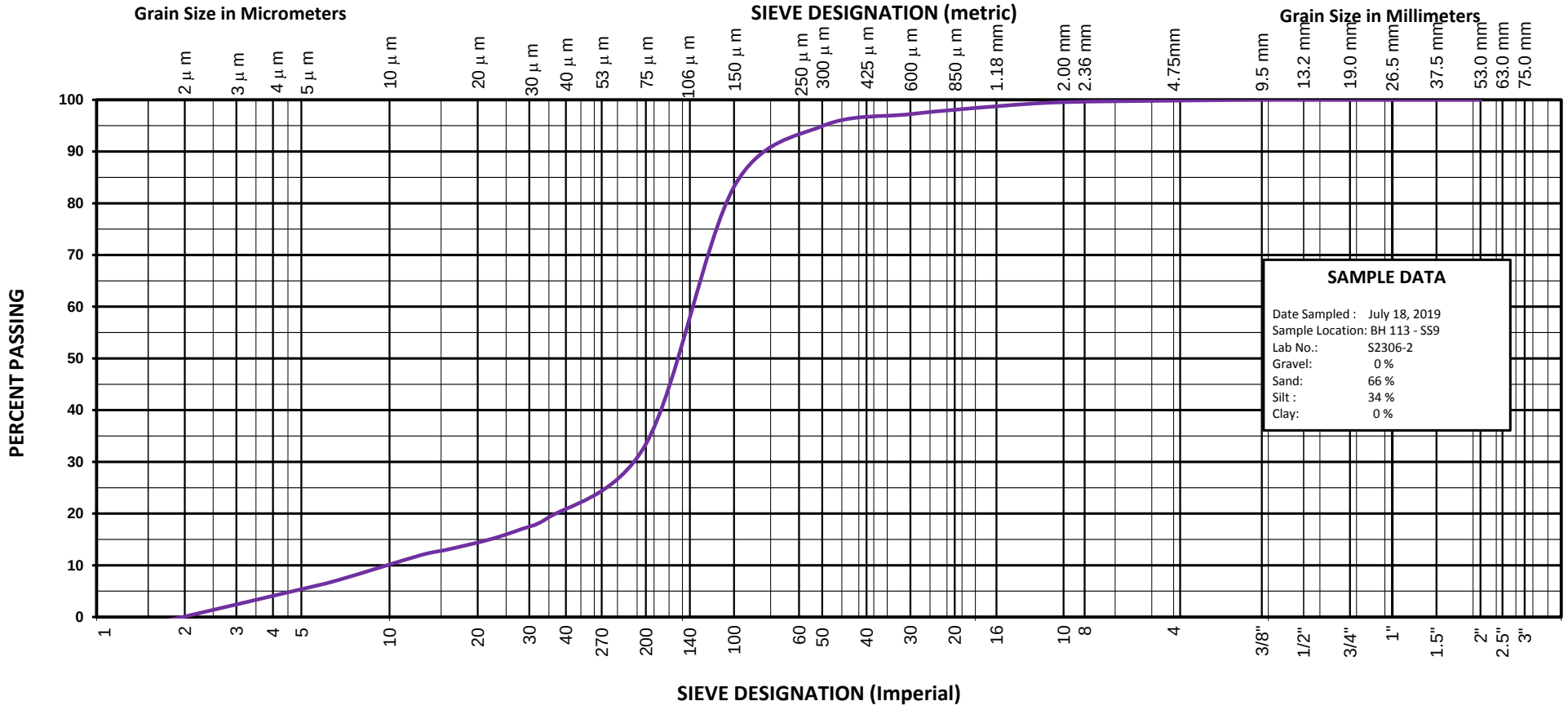

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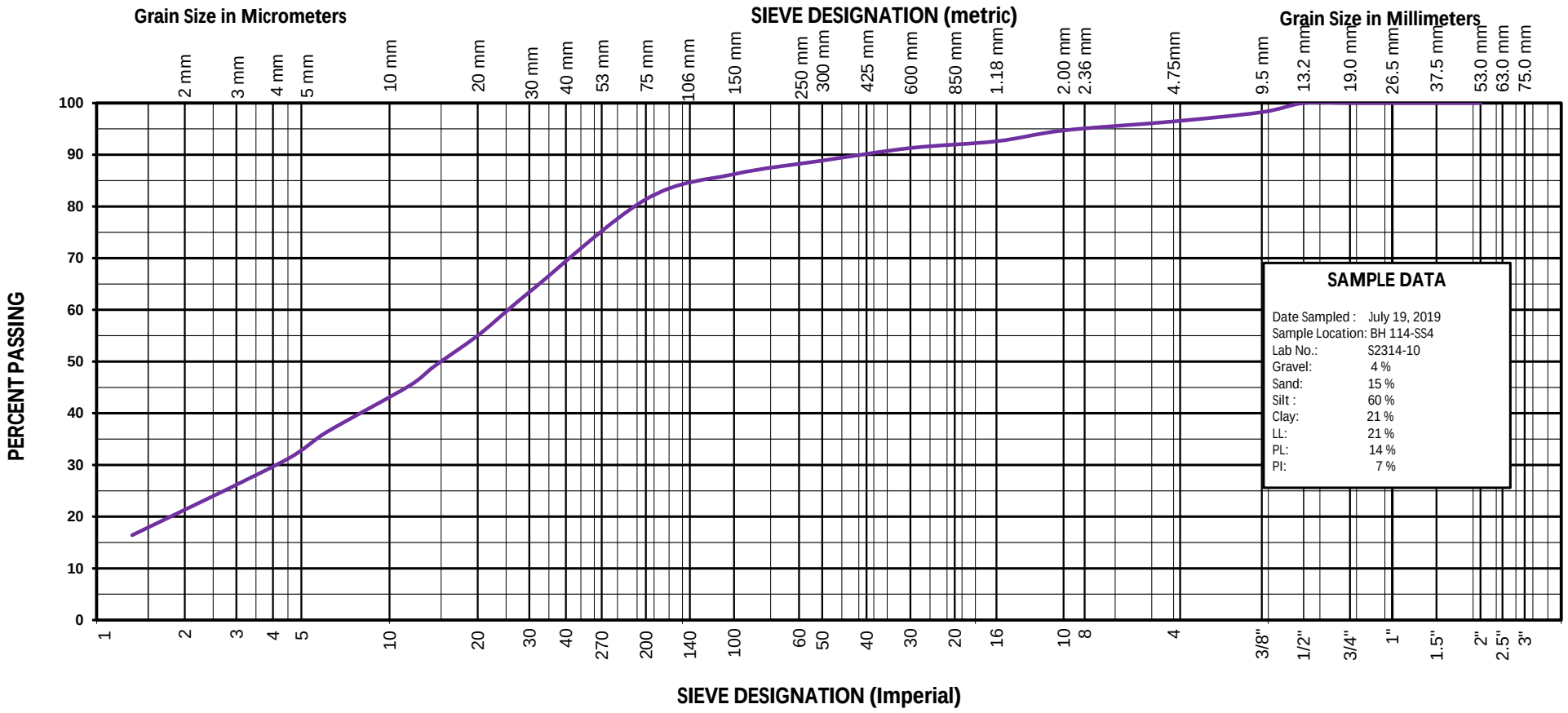

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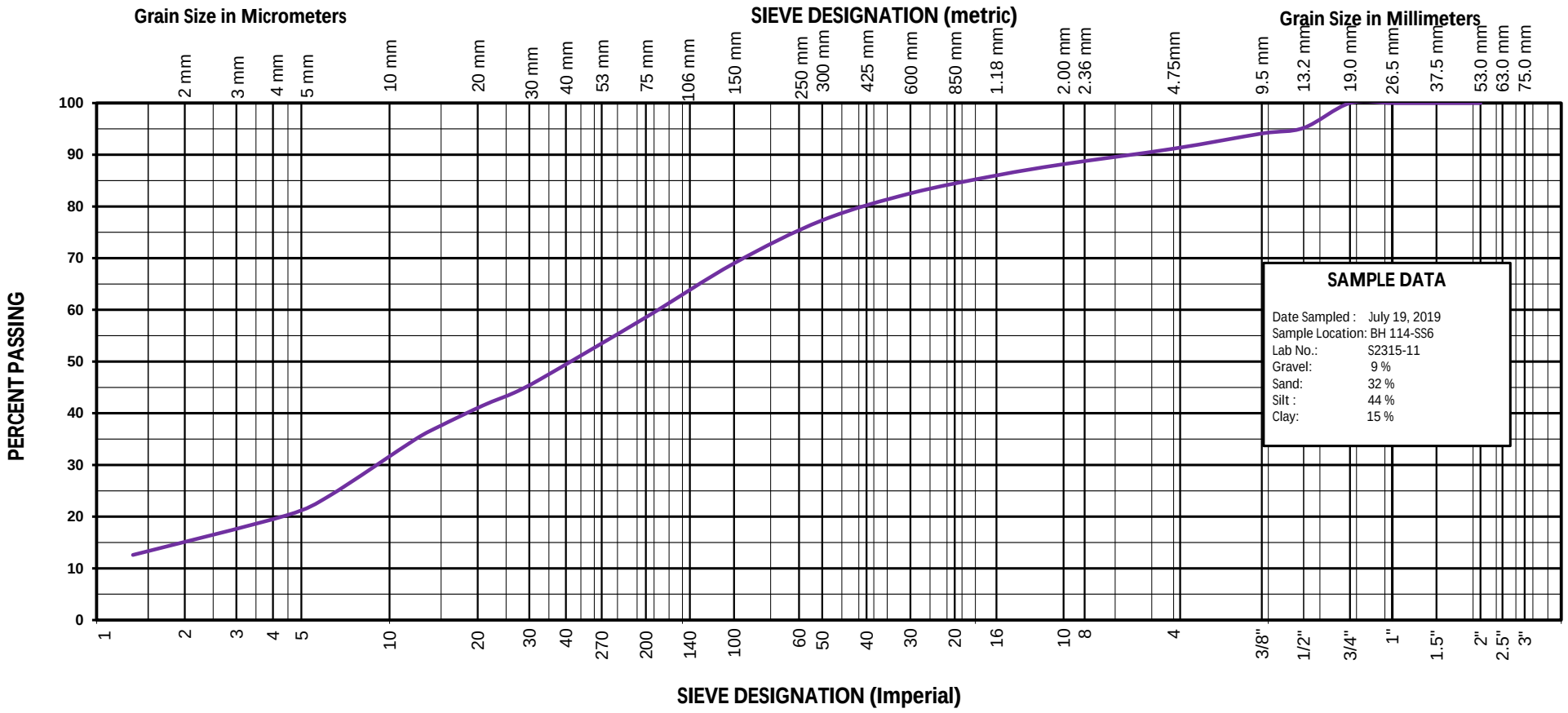

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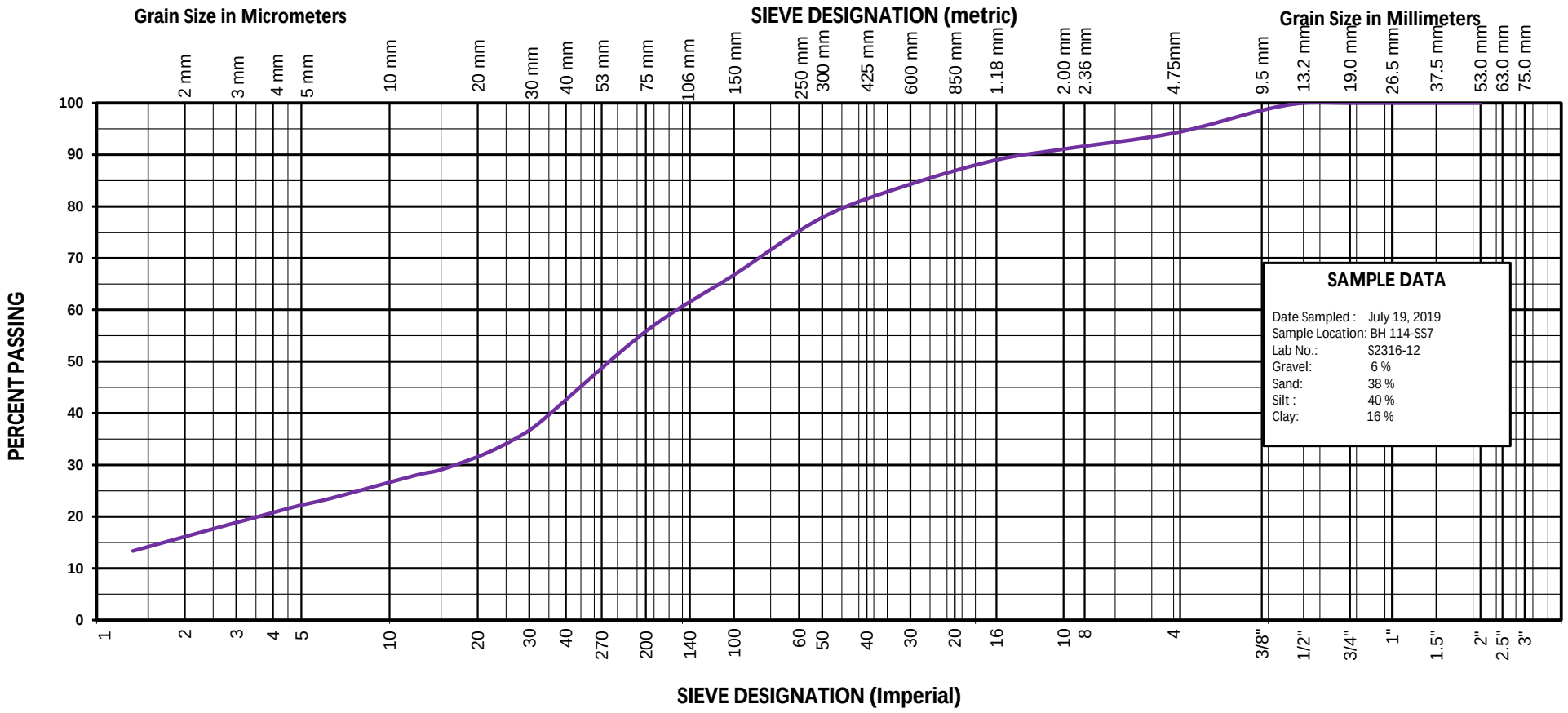

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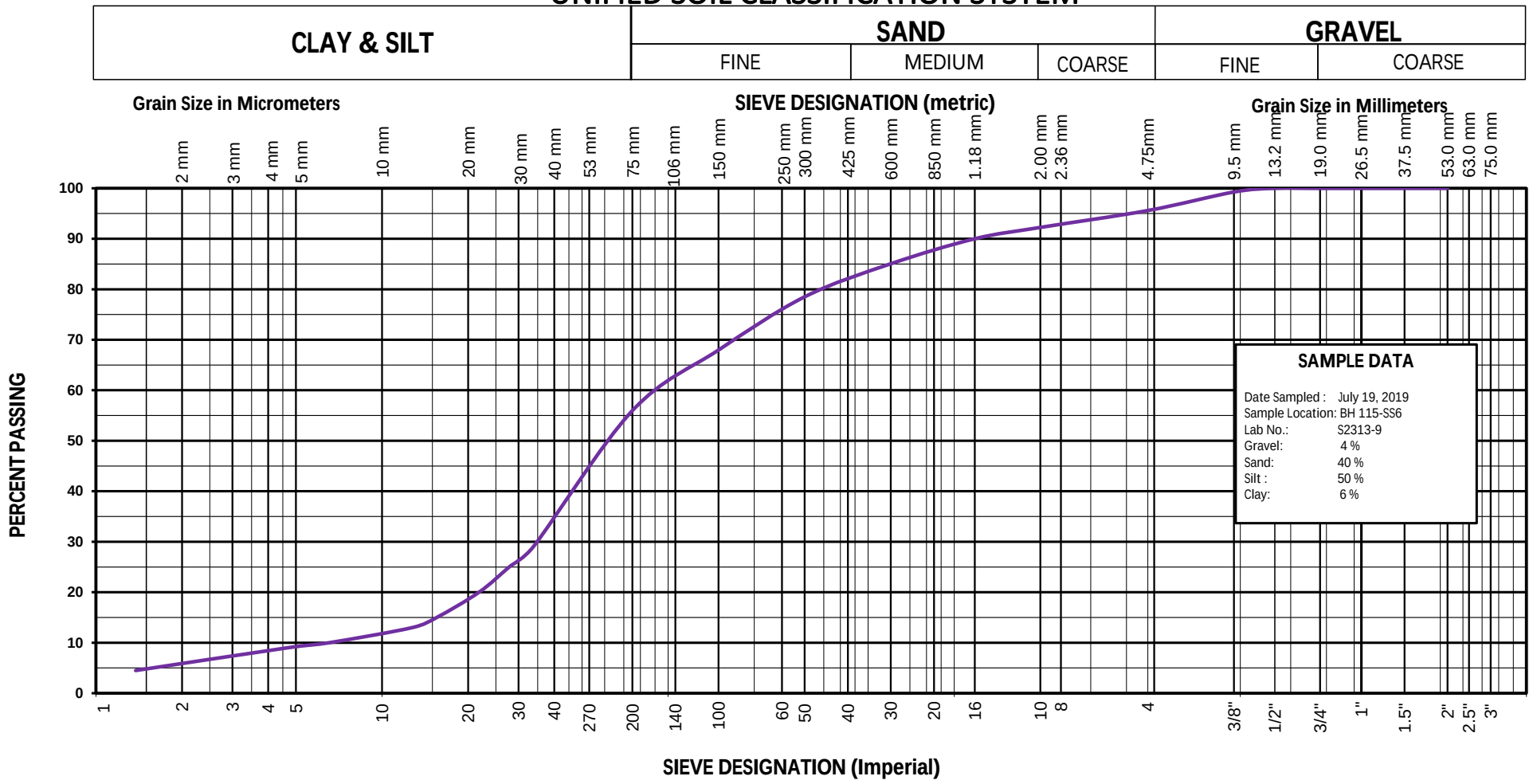
UNIFIED SOIL CLASSIFICATION SYSTEM



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L4K 2Z6
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Fax: (905) 760-5567
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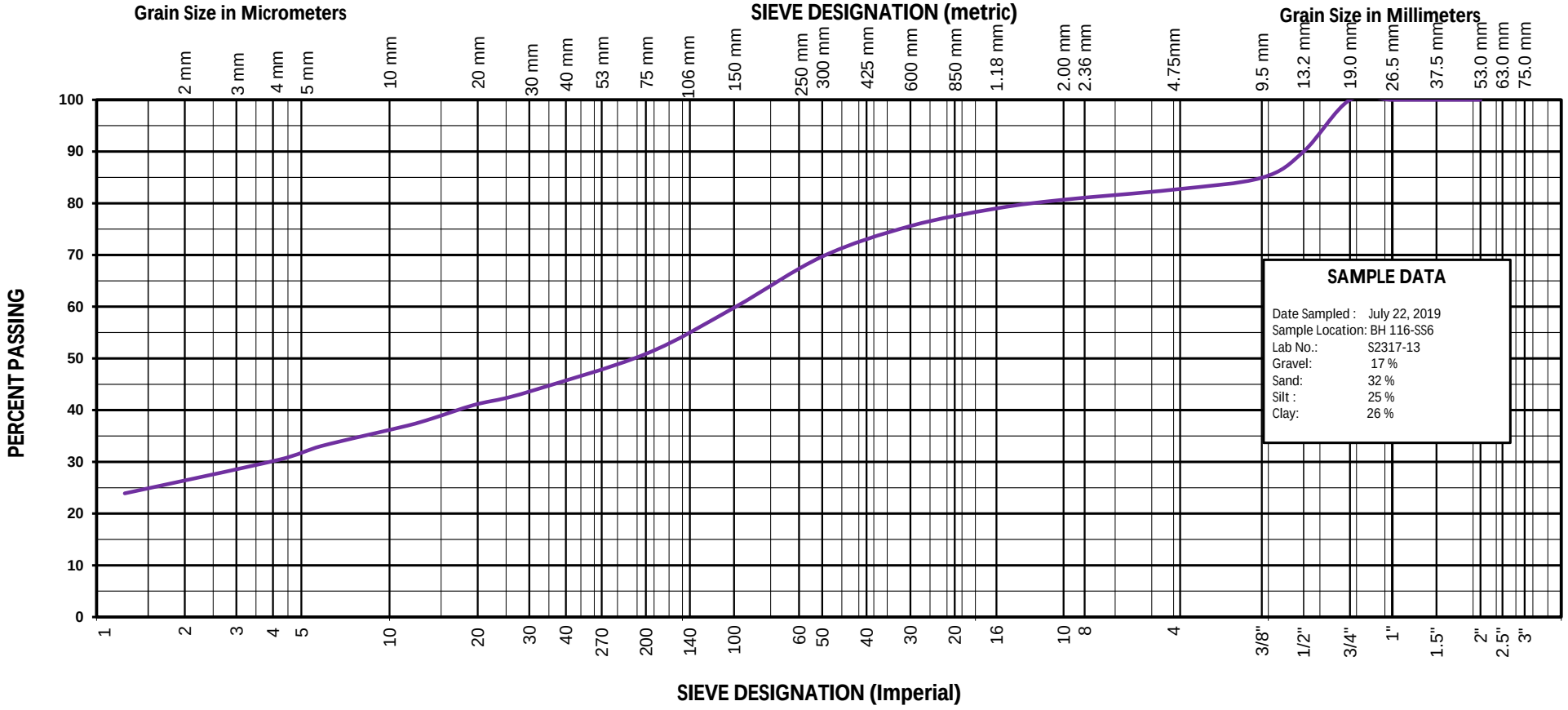
GRAIN SIZE ANALYSIS	**Project :** Seaton Lands	**Project No.:** T19767
	Client: Seaton TFMP Inc.	

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



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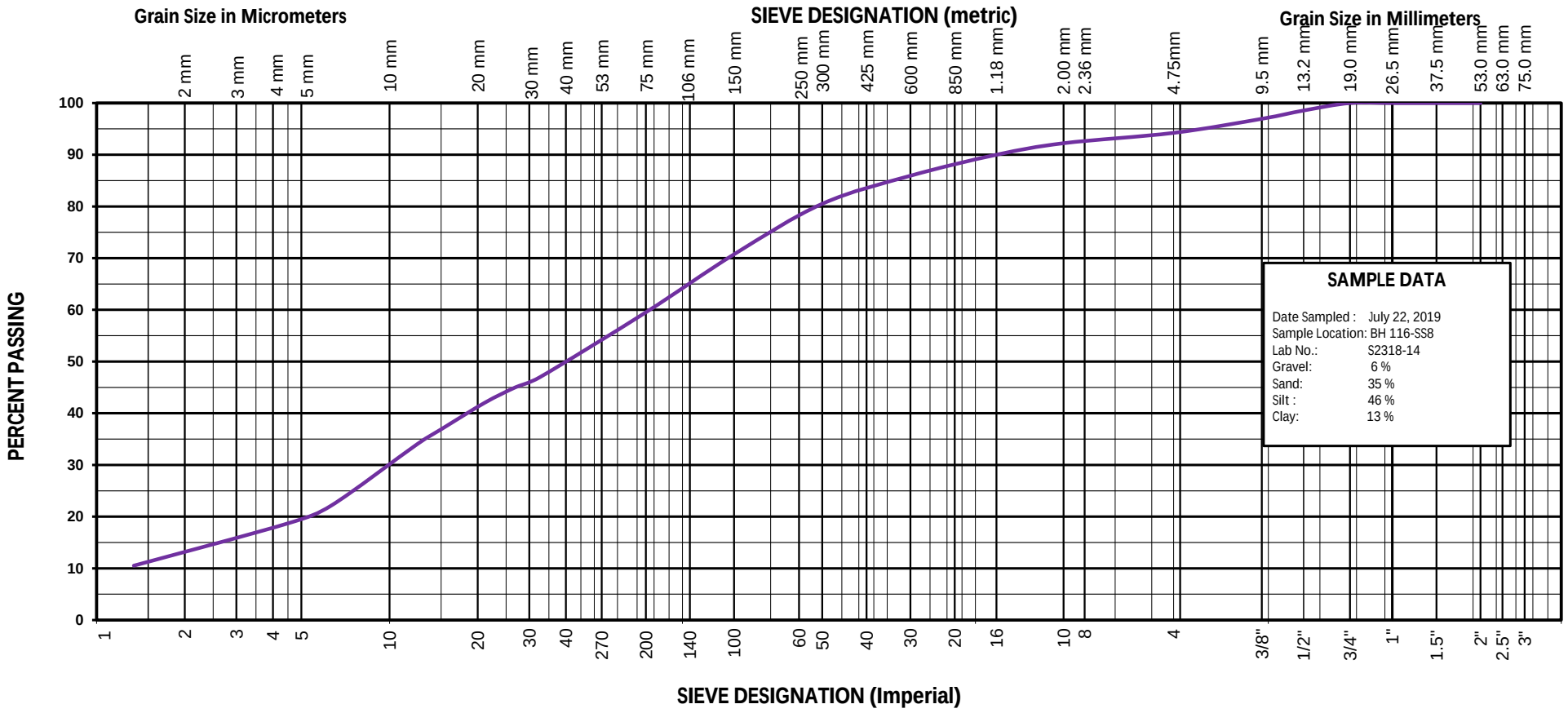
UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



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GRAIN SIZE ANALYSIS	**Project :** Seaton Lands	**Project No.:** T19767
	Client: Seaton TFMP Inc.	

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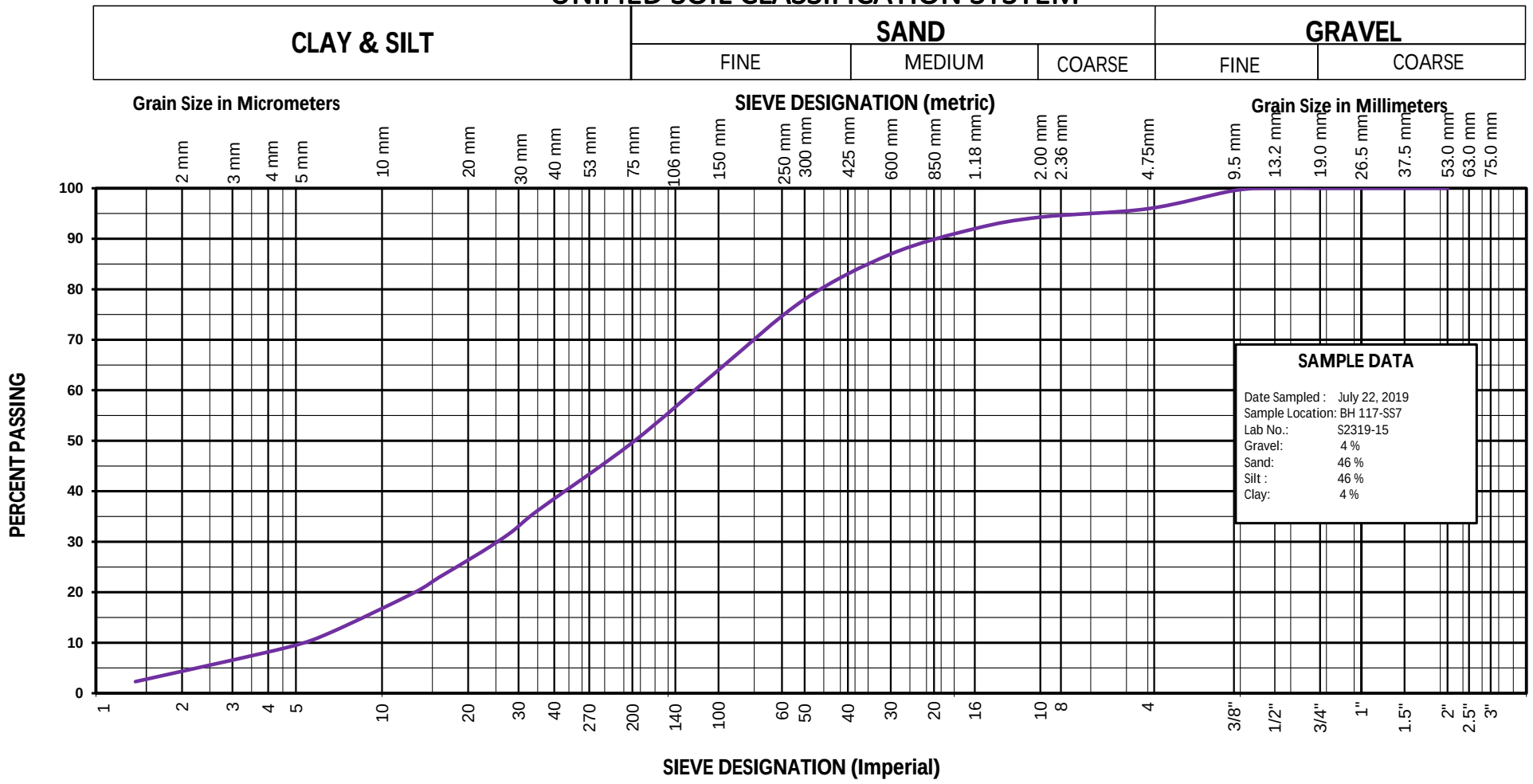

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GRAIN SIZE ANALYSIS

Project : Seaton Lands

Project No.: T19767

Client: Seaton TFMP Inc.

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Appendix D

Groundwater Monitoring

Table D-1
Groundwater Elevation in Wells

Location	Well Depth (mbgs)	Ground Surface Elevation (masl)*	2-May-11		6-Jun-11		24-Aug-11		6-Sep-11		11-Oct-11		21-Nov-11		8-May-12	
			Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)
MW11-7-1	7.07	163.05			1.20	161.85	1.72	161.33			1.05	162.00	-0.67	163.72	0.80	162.25
MW11-7-2s	4.70	144.70			1.23	143.47	1.73	142.97			1.82	142.88	-0.32	145.02	1.29	143.41
MW11-7-2d	9.46	144.70			0.85	143.85	1.31	143.39			1.82	142.88	0.15	144.55	1.31	143.39
BHG7-1-A	9.77	162.00														
BH30-1	4.80	166.92														
BH30-1-A	6.37	166.92														
BH30-5	4.80	156.94														
BH30-5-A	5.97	156.94														
BH30-9	4.38	151.10														
BH30-10	5.88	151.40														
BH113	7.38	145.81														
BH114	4.78	146.64														
BH115	7.70	148.92														
BH116	6.35	149.22														
BH117	6.45	144.50														
WPZ-U-09-1s	0.85	143.00	0.88	142.32	0.90	142.30			dry	dry			0.99	142.21	0.85	142.35
WPZ-U-09-1d	1.44	143.00	-0.39	142.53	-0.44	142.58			-0.01	142.15			0.02	142.12	-0.25	142.39
WPZ-U-09-2s	1.15	145.20														
WPZ-U-09-2d	1.80	145.13														

Notes

mbgs - meters below ground surface

masl - metres above sea level

Table D-1
Groundwater Elevation in Wells

Location	Well Depth (mbgs)	Ground Surface Elevation (masl)*	19-Jul-12		1-Oct-12		8-Dec-12		17-Jan-18		25-Jan-18		19-Jul-19		29-Jul-19	
			Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)
MW11-7-1	7.07	163.05	0.96	162.09	dry	dry	0.82	162.23								
MW11-7-2s	4.70	144.70	1.74	142.96	1.15	143.55	0.49	144.21								
MW11-7-2d	9.46	144.70	1.75	142.95	1.79	142.91	1.09	143.61								
BHG7-1-A	9.77	162.00											dry	dry	dry	dry
BH30-1	4.80	166.92							dry	dry	dry	dry				
BH30-1-A	6.37	166.92											5.80	161.12	4.80	162.12
BH30-5	4.80	156.94							1.20	155.74	1.10	155.84				
BH30-5-A	5.97	156.94											4.50	152.44	2.10	154.84
BH30-9	4.38	151.10							1.40	149.70	1.30	149.80				
BH30-10	5.88	151.40							1.70	149.70	1.60	149.80				
BH113	7.38	145.81											2.20	143.61	0.00	145.81
BH114	4.78	146.64											1.20	145.44	1.00	145.64
BH115	7.70	148.92											2.20	146.72	2.60	146.32
BH116	6.35	149.22											3.40	145.82	1.80	147.42
BH117	6.45	144.50													1.30	143.20
WPZ-U-09-1s	0.85	143.00	dry	dry	dry	dry	0.80	142.40								
WPZ-U-09-1d	1.44	143.00	0.04	142.10	-0.05	142.19	-0.29	142.43								
WPZ-U-09-2s	1.15	145.20														
WPZ-U-09-2d	1.80	145.13														

Notes

mbgs - meters below ground surface

masl - metres above sea level

Table D-1
Groundwater Elevation in Wells

Location	Well Depth (mbgs)	Ground Surface Elevation (masl)*	6-Aug-19		8-Aug-19		15-Aug-19		20-Aug-19		27-Aug-19		27-Sep-19		29-Oct-19	
			Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)
MW11-7-1	7.07	163.05			1.85	161.20	2.06	160.99	2.14	160.91	2.25	160.80	2.98	160.07	3.58	159.47
MW11-7-2s	4.70	144.70			1.73	142.97	1.83	142.87	1.85	142.85	1.82	142.88	1.87	142.83	1.07	143.63
MW11-7-2d	9.46	144.70			1.38	143.32	1.50	143.21	1.56	143.14	1.65	143.05	1.90	142.80	1.81	142.89
BHG7-1-A	9.77	162.00	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	9.70	152.30	9.72	152.28
BH30-1	4.80	166.92			dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	4.82	162.10
BH30-1-A	6.37	166.92	5.00	161.92	5.02	161.90	5.26	161.66	5.37	161.55	5.52	161.40	6.15	160.77	6.30	160.62
BH30-5	4.80	156.94			damaged	n/a	damaged	n/a	damaged	n/a	damaged	n/a	damaged	n/a	damaged	n/a
BH30-5-A	5.97	156.94	2.20	154.74	2.20	154.74	2.45	154.49	2.62	154.32	2.77	154.18	3.69	153.25	4.36	152.58
BH30-9	4.38	151.10			1.80	149.30	1.97	149.13	2.08	149.02	2.22	148.88	2.77	148.33	3.00	148.10
BH30-10	5.88	151.40			2.23	149.17	2.45	148.95	2.59	148.81	2.75	148.65	3.38	148.02	3.84	147.56
BH113	7.38	145.81	0.00	145.81	-0.89	146.70	-0.83	146.64	-0.82	146.63	-0.82	146.63	-0.80	146.61	-0.80	146.61
BH114	4.78	146.64	1.00	145.64	0.99	145.65	1.04	145.60	1.05	145.60	1.04	145.60	1.16	145.48	0.93	145.71
BH115	7.70	148.92	2.70	146.22	2.75	146.17	2.92	146.00	3.03	145.89	3.13	145.80	3.69	145.23	4.01	144.91
BH116	6.35	149.22	1.90	147.32	1.92	147.30	2.07	147.15	2.12	147.10	2.19	147.03	2.42	146.80	2.27	146.95
BH117	6.45	144.50	1.40	143.10	0.81	143.69	1.42	143.08	1.44	143.06	1.42	143.09	1.49	143.01	0.78	143.72
WPZ-U-09-1s	0.85	143.00														
WPZ-U-09-1d	1.44	143.00														
WPZ-U-09-2s	1.15	145.20											0.55	144.65	0.25	144.95
WPZ-U-09-2d	1.80	145.13											0.95	144.18	0.25	144.88

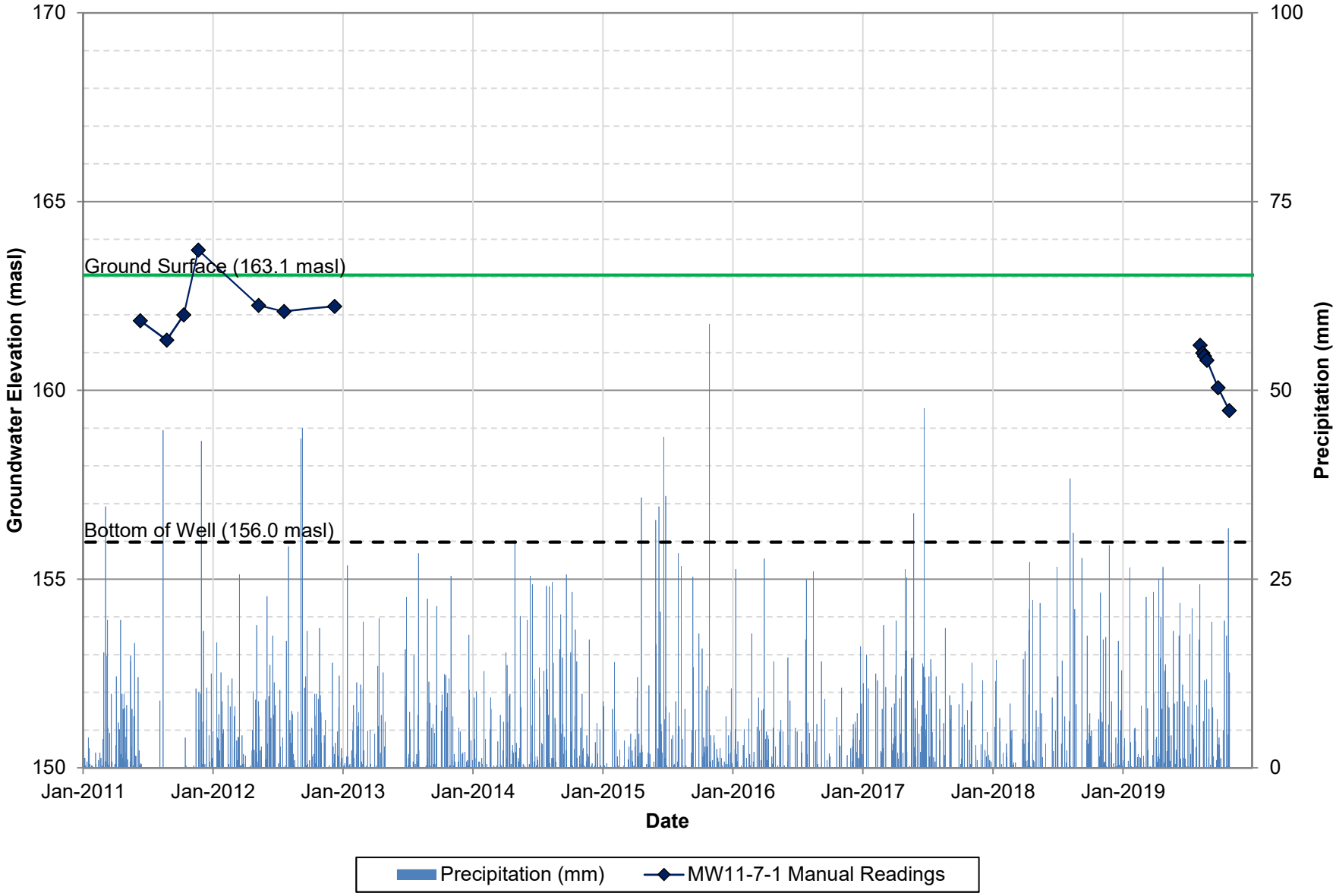
Notes

mbgs - meters below ground surface

masl - metres above sea level

MW11-7-1 Groundwater Elevations

(Well Depth: 7.1 m, Screened in Silty Sand/Sandy Silt Till)



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Development Hydrogeology
10/31/2019

Figure D-1

Mattamy Homes
Thompson's Corner H.A.
300050288

MW11-7-2s/d, BH117 Groundwater Elevations

(7-2s Well Depth: 4.7 m, Screened in Clayey Silt Till)
(7-2d Well Depth: 9.5 m, Screened in Clayey Silt Till)
(BH117 Well Depth: 6.5 m, Screened in Silty Sand/Sandy Silt Till)

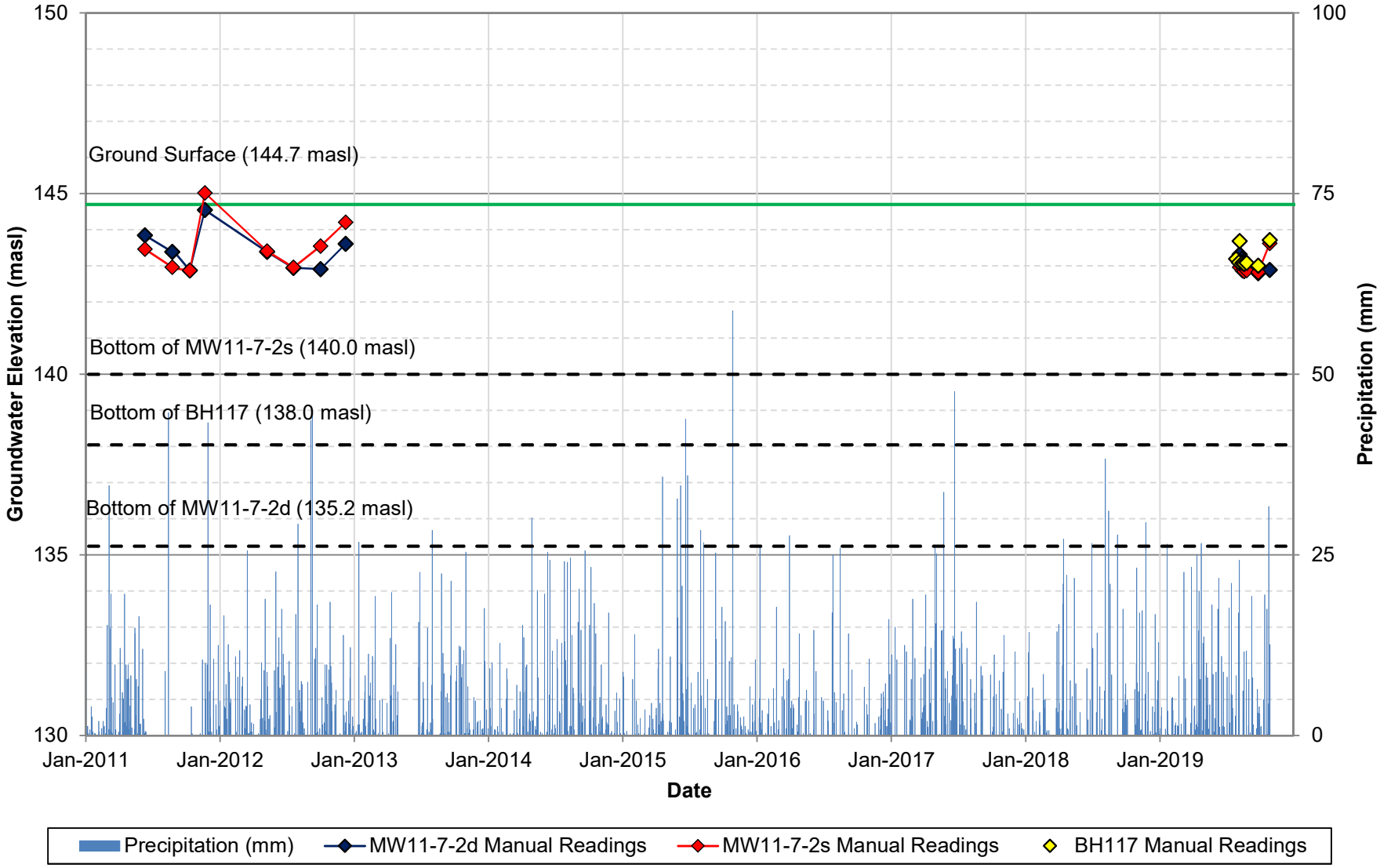

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Figure D-2

Mattamy Homes
Thompson's Corner H.A.
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BHG7-1-A Groundwater Elevations

(Well Depth: 9.8 m, Screened in Silty Sand Till)

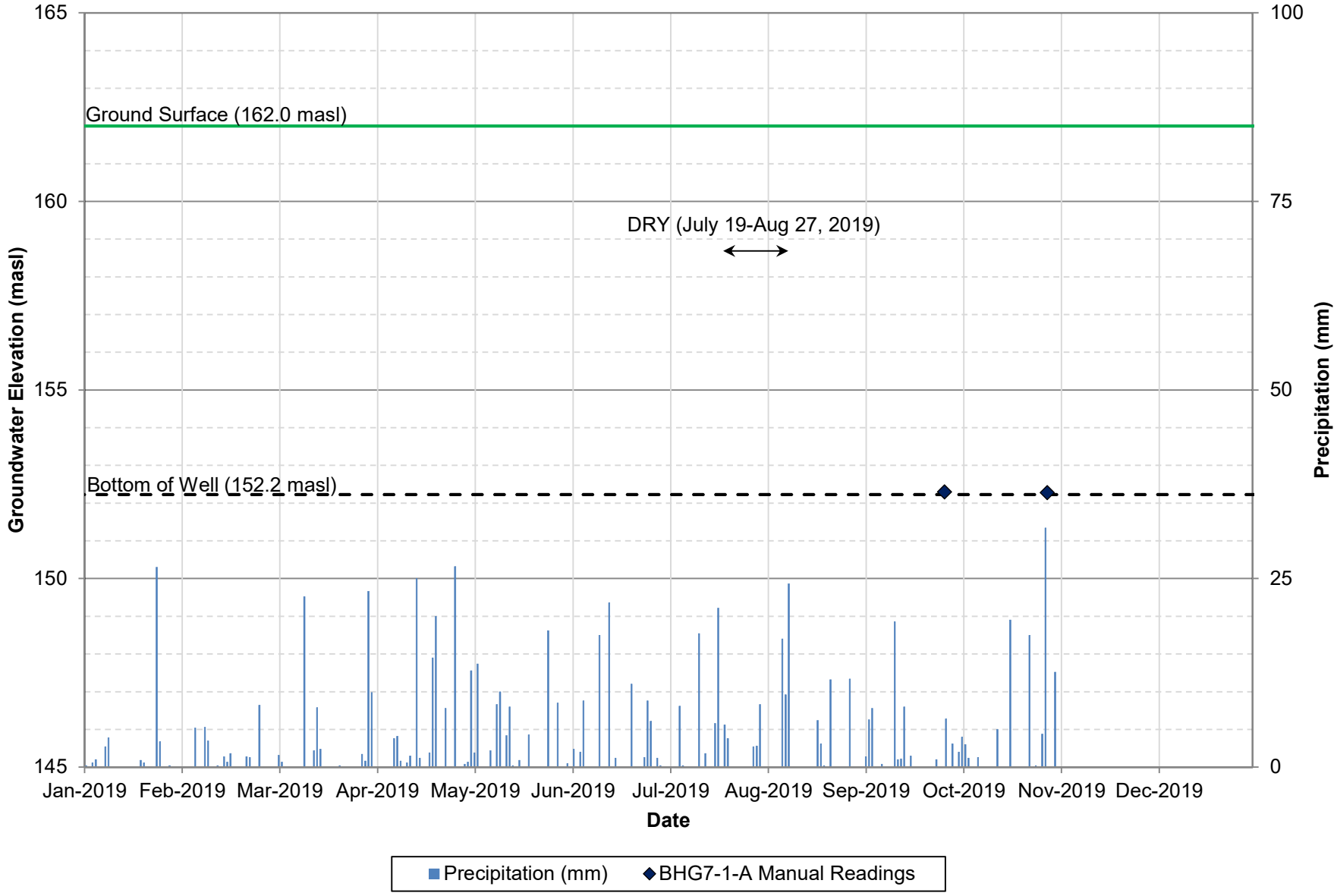

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Figure D-3

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Thompson's Corner H.A.
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BH30-1 and BH30-1-A Groundwater Elevations

(BH30-1 Well Depth: 4.8 m, Screened in Silty Sand/Sandy Silt Till)
(BH30-1-A Well Depth: 6.4 m, Screened in Silty Sand/Sandy Silt Till)

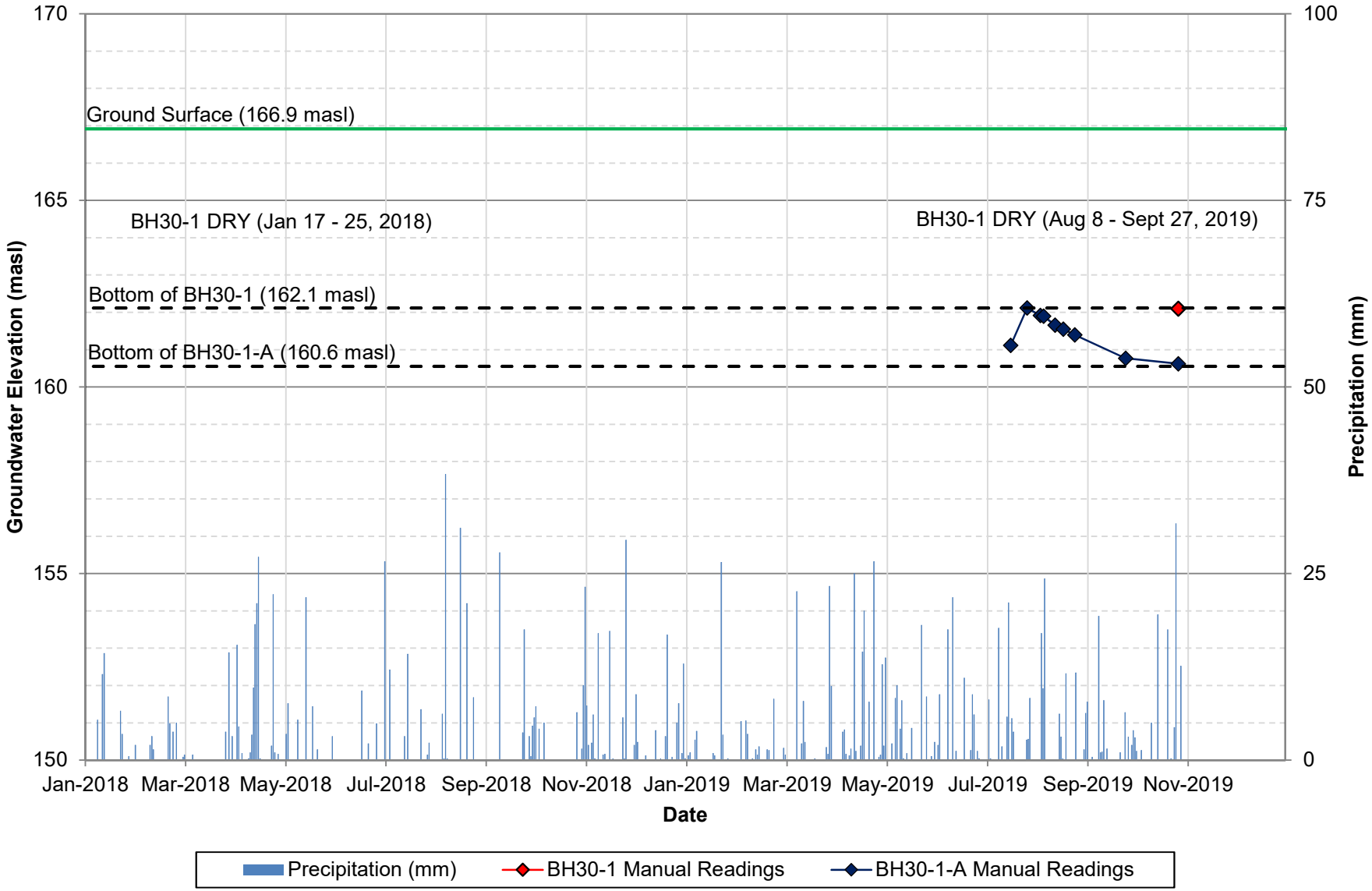

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Figure D-4

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Thompson's Corner H.A.
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BH30-5 and BH30-5-A Groundwater Elevations

(BH30-5 Well Depth: 4.8 m, Screened in Silty Sand/Sandy Silt Till)
(BH30-5-A Well Depth: 6.0 m, Screened in Silty Sand/Sandy Silt Till)

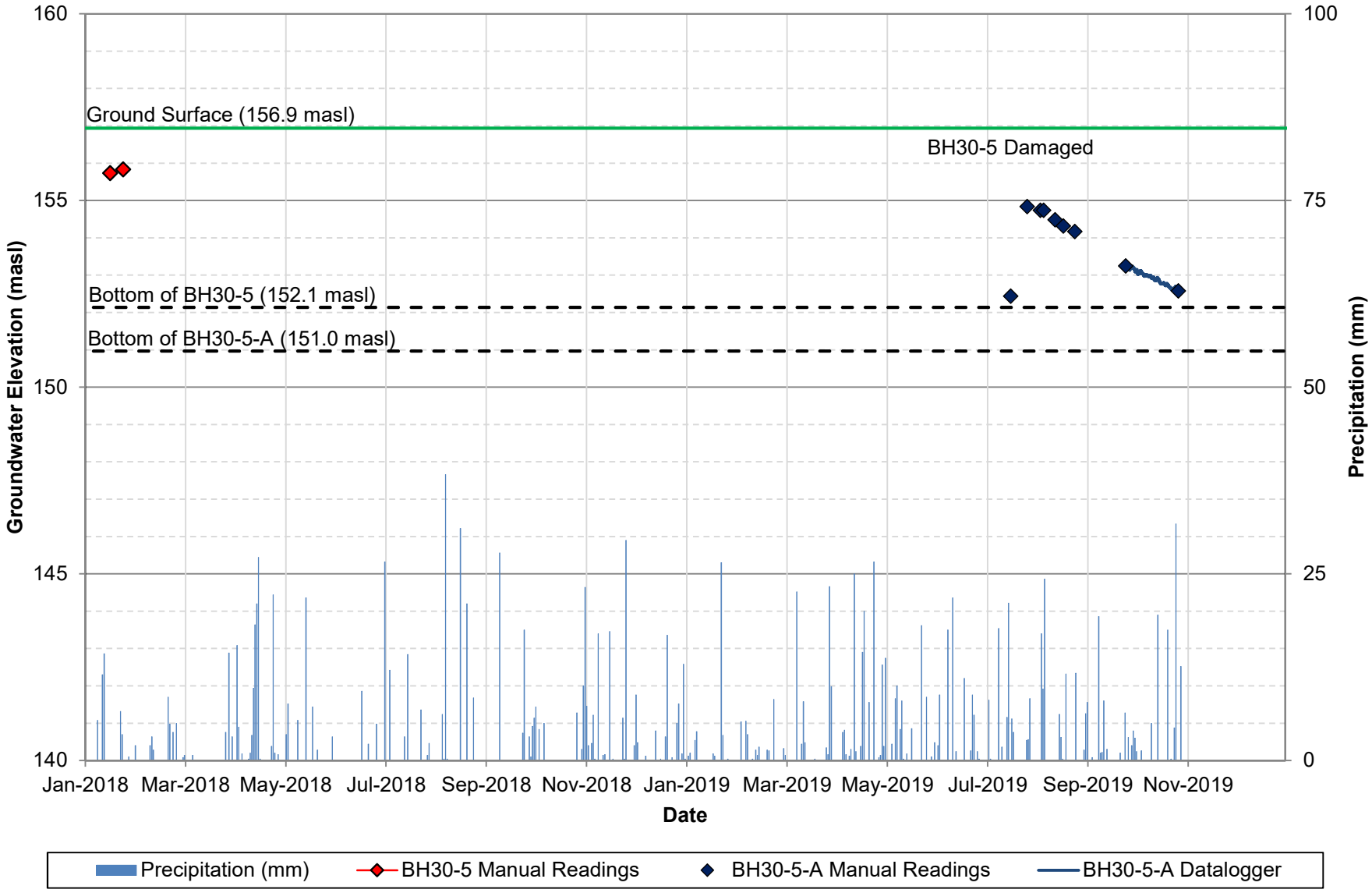

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Figure D-5

Mattamy Homes
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300050288

BH30-9 Groundwater Elevations

(Well Depth: 4.4 m, Screened in Silty Sand/Sandy Silt Till)

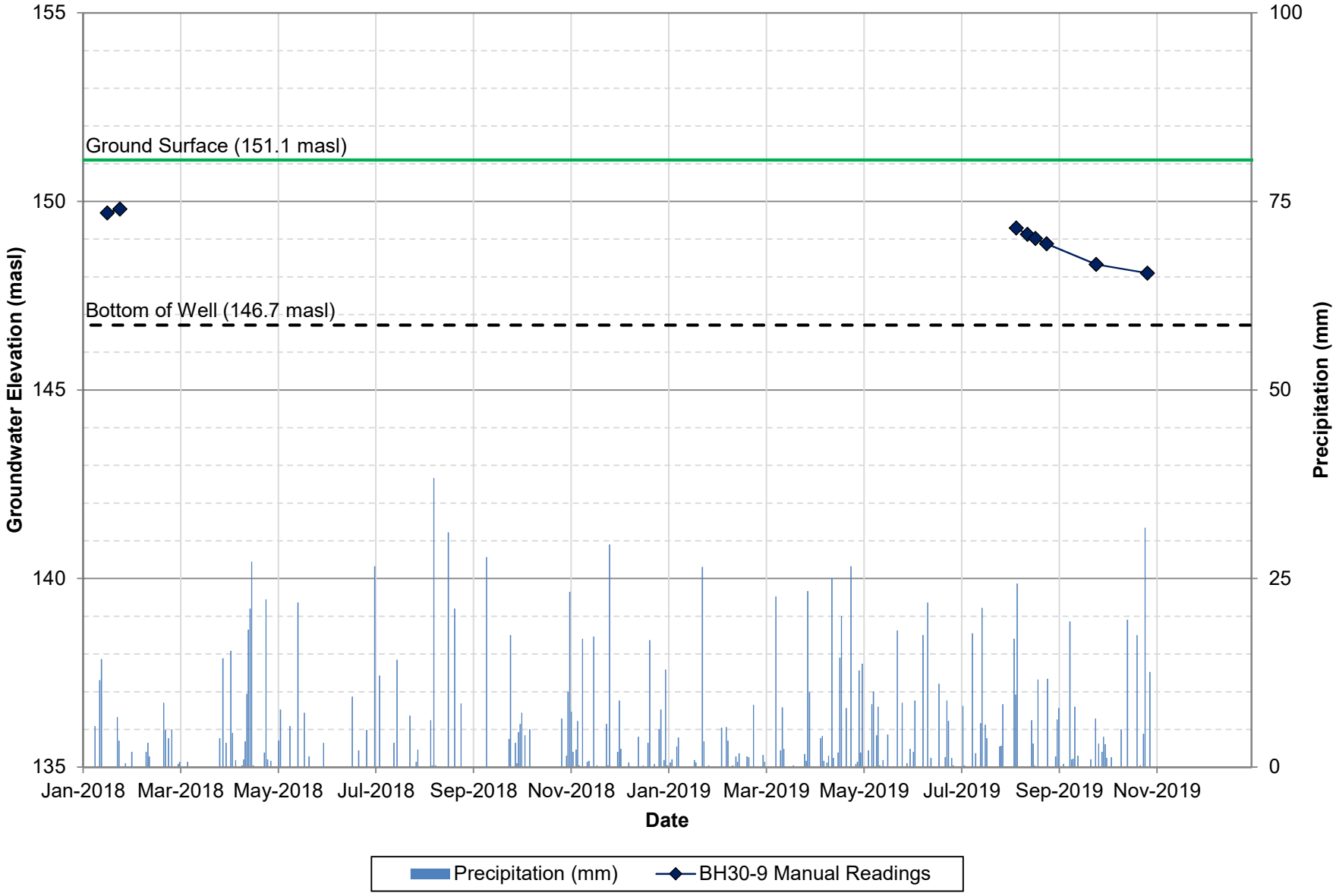

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Figure D-6

Mattamy Homes
Thompson's Corner H.A.
300050288

BH30-10 Groundwater Elevations

(Well Depth: 5.9 m, Screened in Silty Sand/Sandy Silt Till)

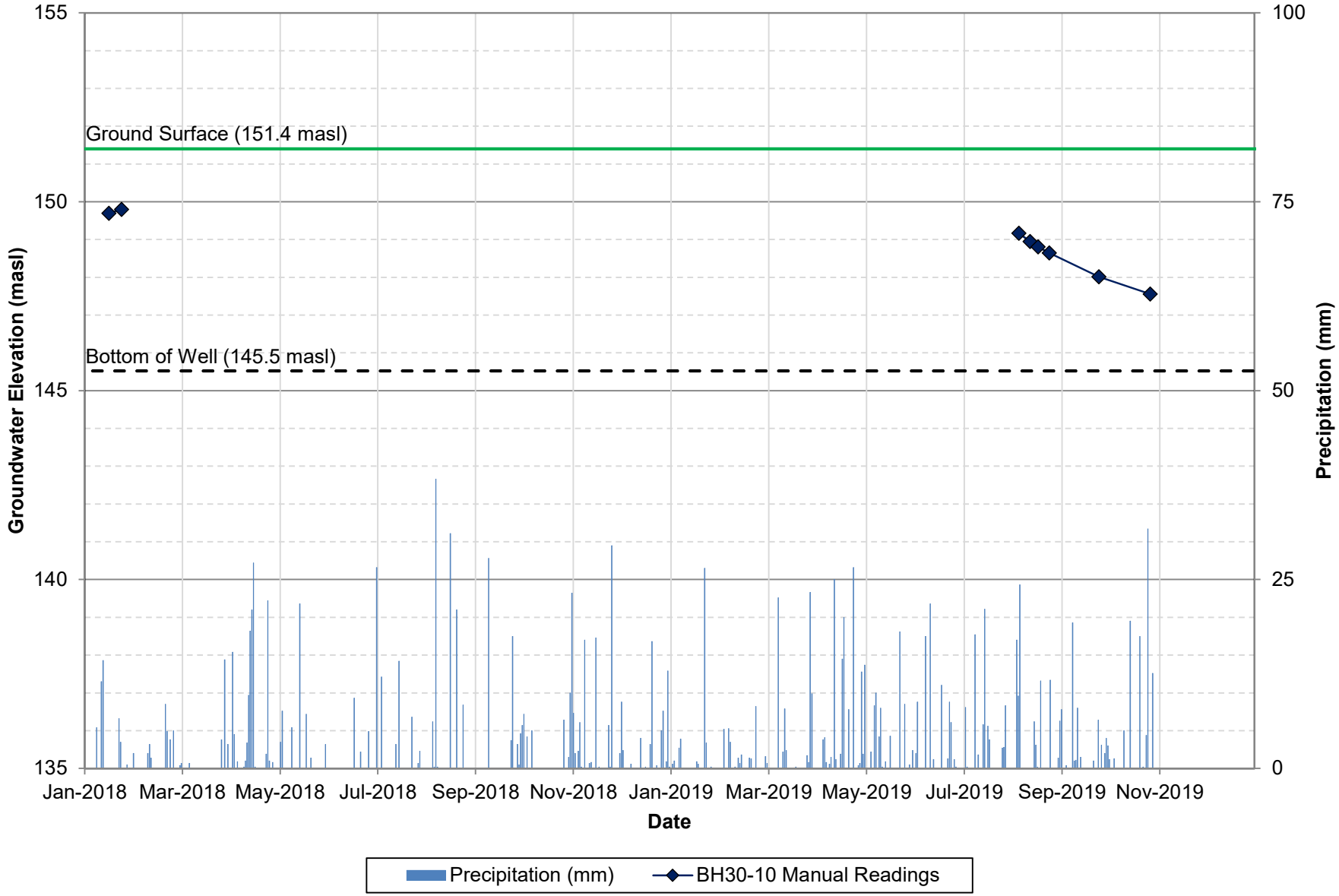

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Figure D-7

Mattamy Homes
Thompson's Corner H.A.
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BH113, BH114, BH115 Groundwater Elevations

(BH113 Well Depth: 7.4 m, Screened in Silty Sand)
(BH114 Well Depth: 4.8 m, Screened in Clayey Sandy Silt Till)
(BH115 Well Depth: 7.7 m, Screened in Clayey Sandy Silt Till)

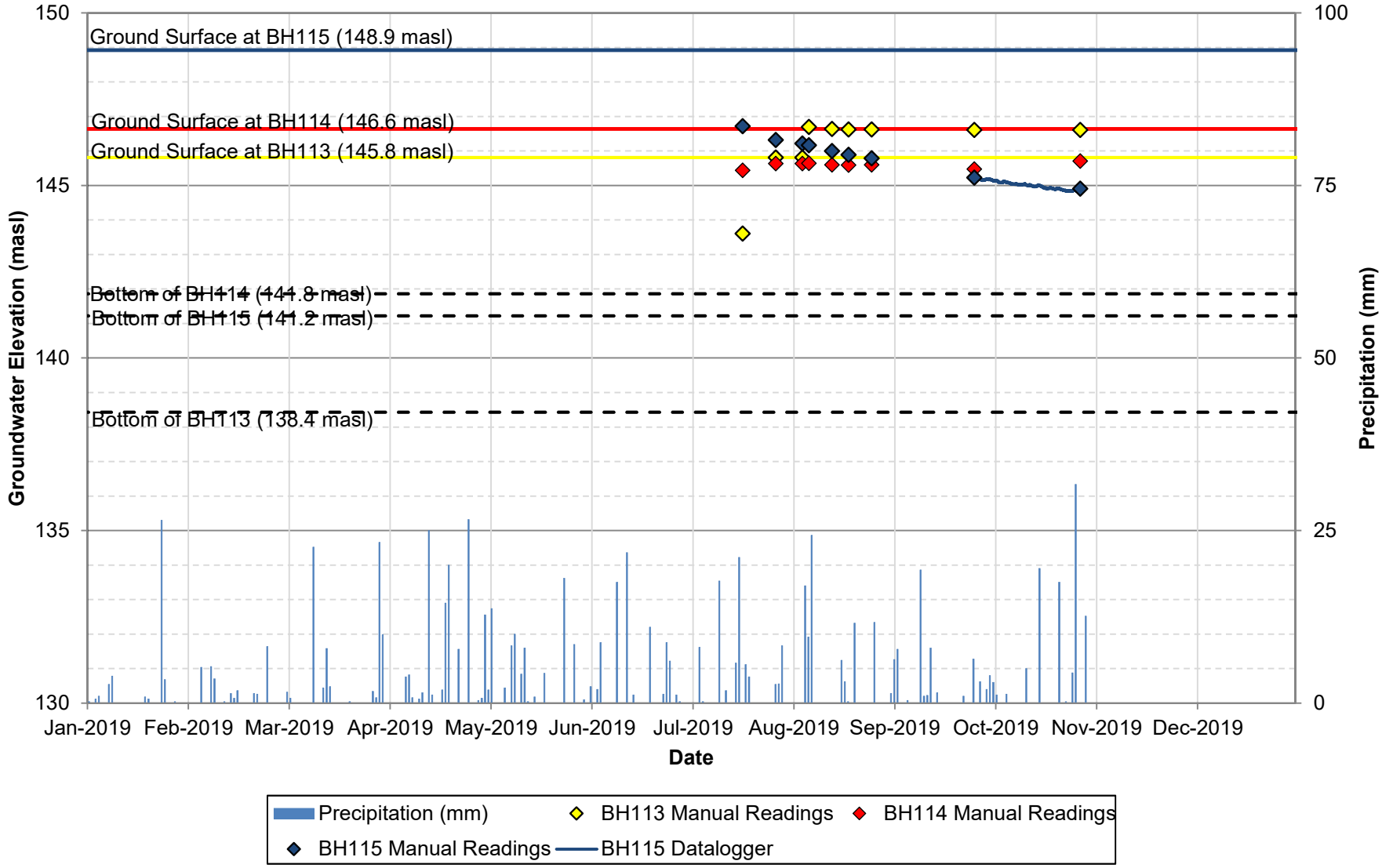

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Figure D-8

Mattamy Homes
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300050288

BH116 Groundwater Elevations

(Well Depth: 6.4 m, Screened in Clayey Silty Sand/Sandy Silt Till)

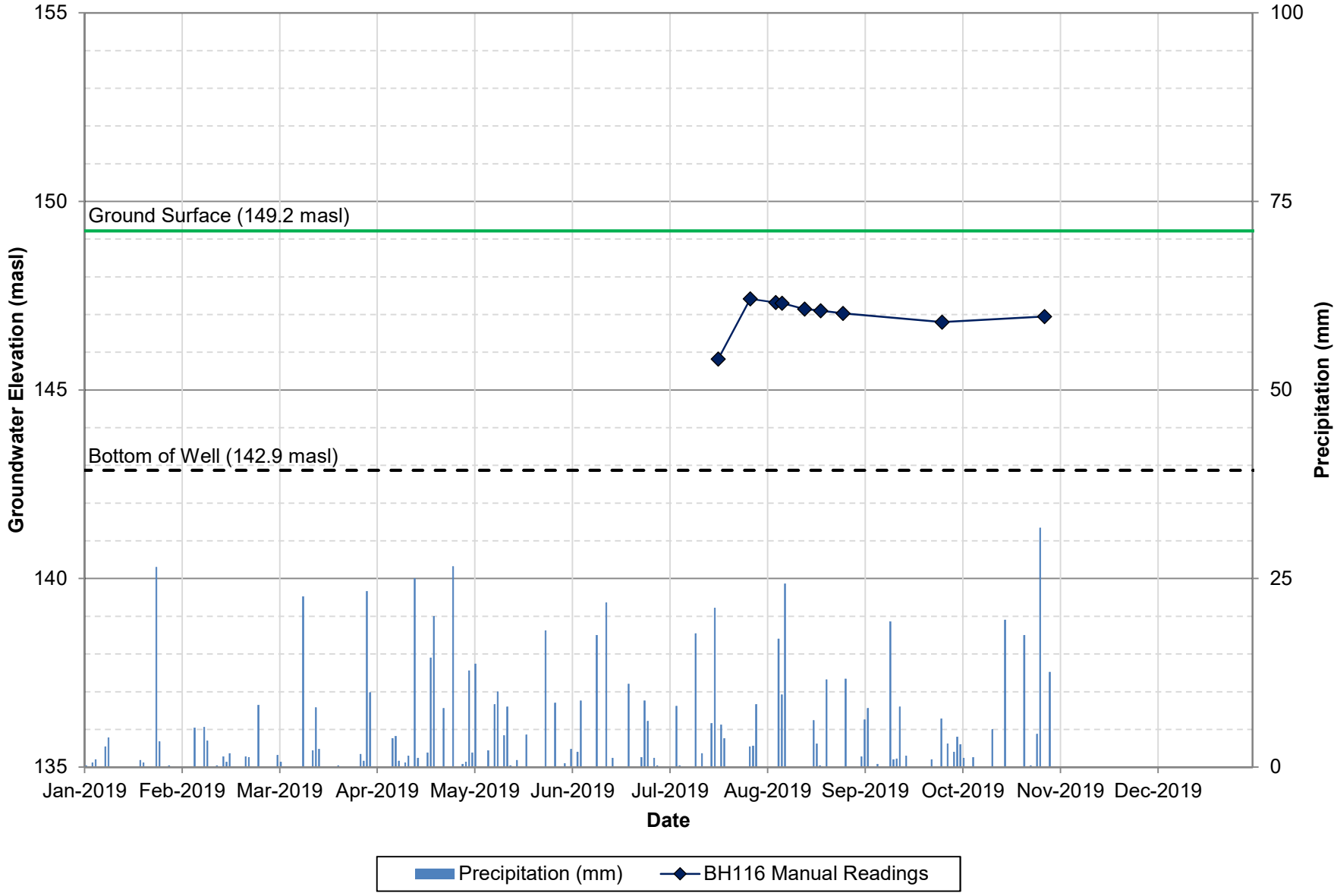

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Figure D-9

Mattamy Homes
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WPZ-U-09-1s/d Groundwater Elevations

(09-1s Well Depth: 0.85 m, Screened in Surficial Wetland Deposits)
(09-1d Well Depth: 1.44 m, Screened in Surficial Wetland Deposits)

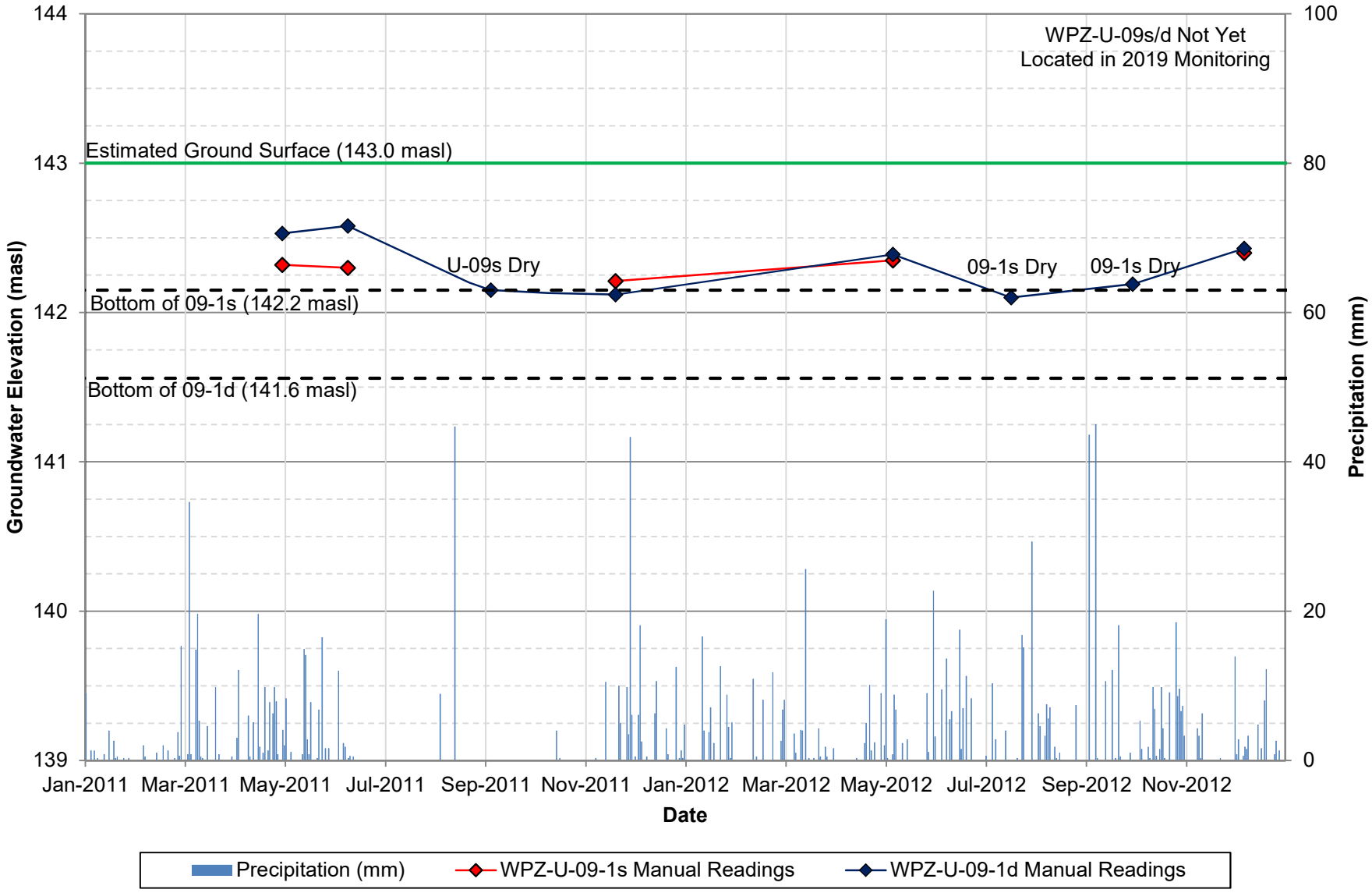

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Figure D-10

Mattamy Homes
Thompson's Corner H.A.
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WPZ-U-09-2s/d Groundwater Elevations

(09-2s Well Depth: 1.15 m, Screened in Surficial Wetland Deposits)
(09-2d Well Depth: 1.80 m, Screened in Surficial Wetland Deposits)

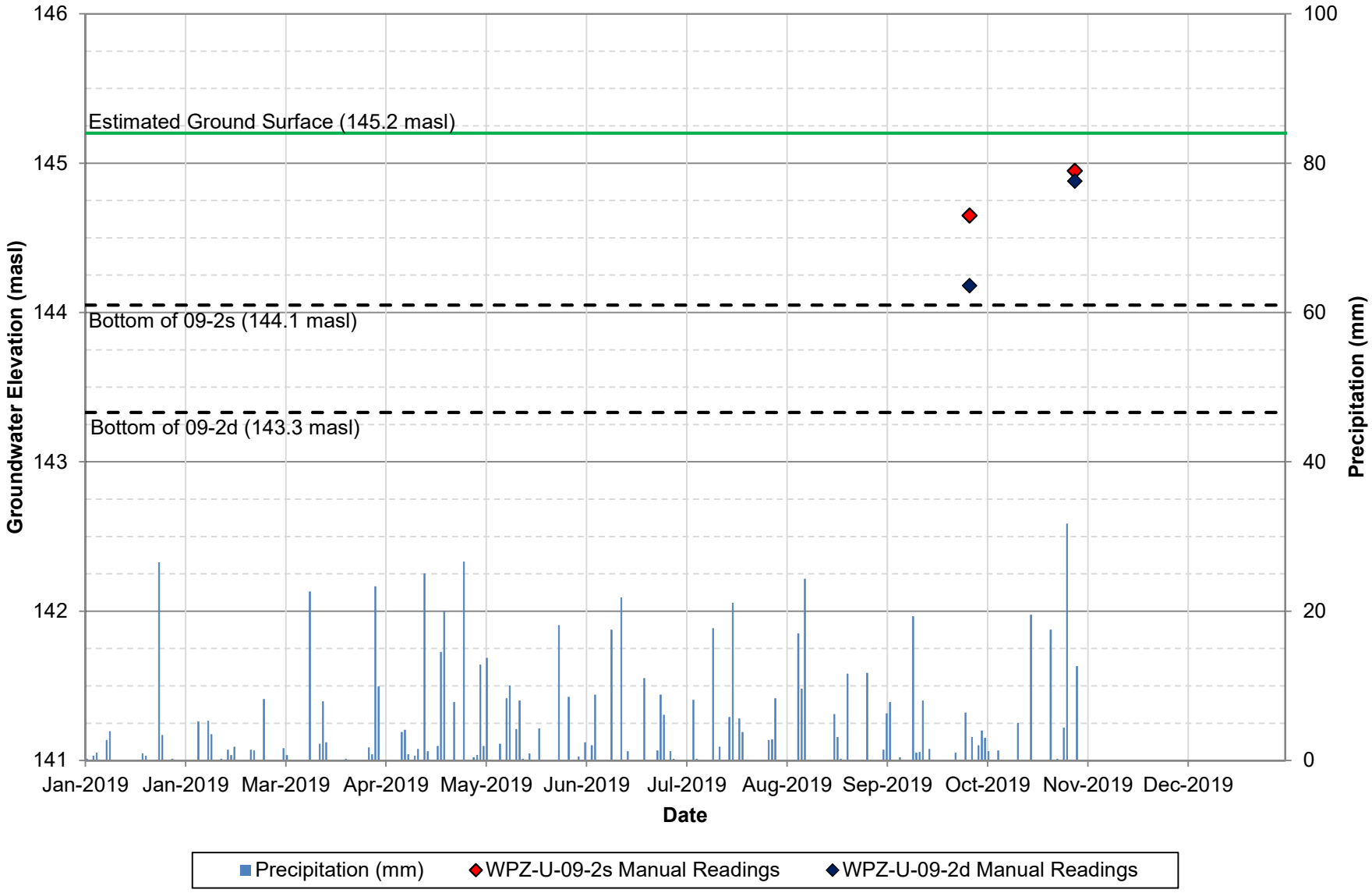

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Figure D-11

Mattamy Homes
Thompson's Corner H.A.
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Appendix E

Hydraulic Conductivity and Infiltration Testing

LEGEND

- NEIGHBOURHOOD 20 BOUNDARY
- INFILTRATION TEST LOCATION
- HYDRAULIC CONDUCTIVITY TEST LOCATION (Burnside)

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

Scale 1:12,500
February 2013
Project Number:

Projection: UTM Zone 17
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Shaw

FIGURE N20-F1

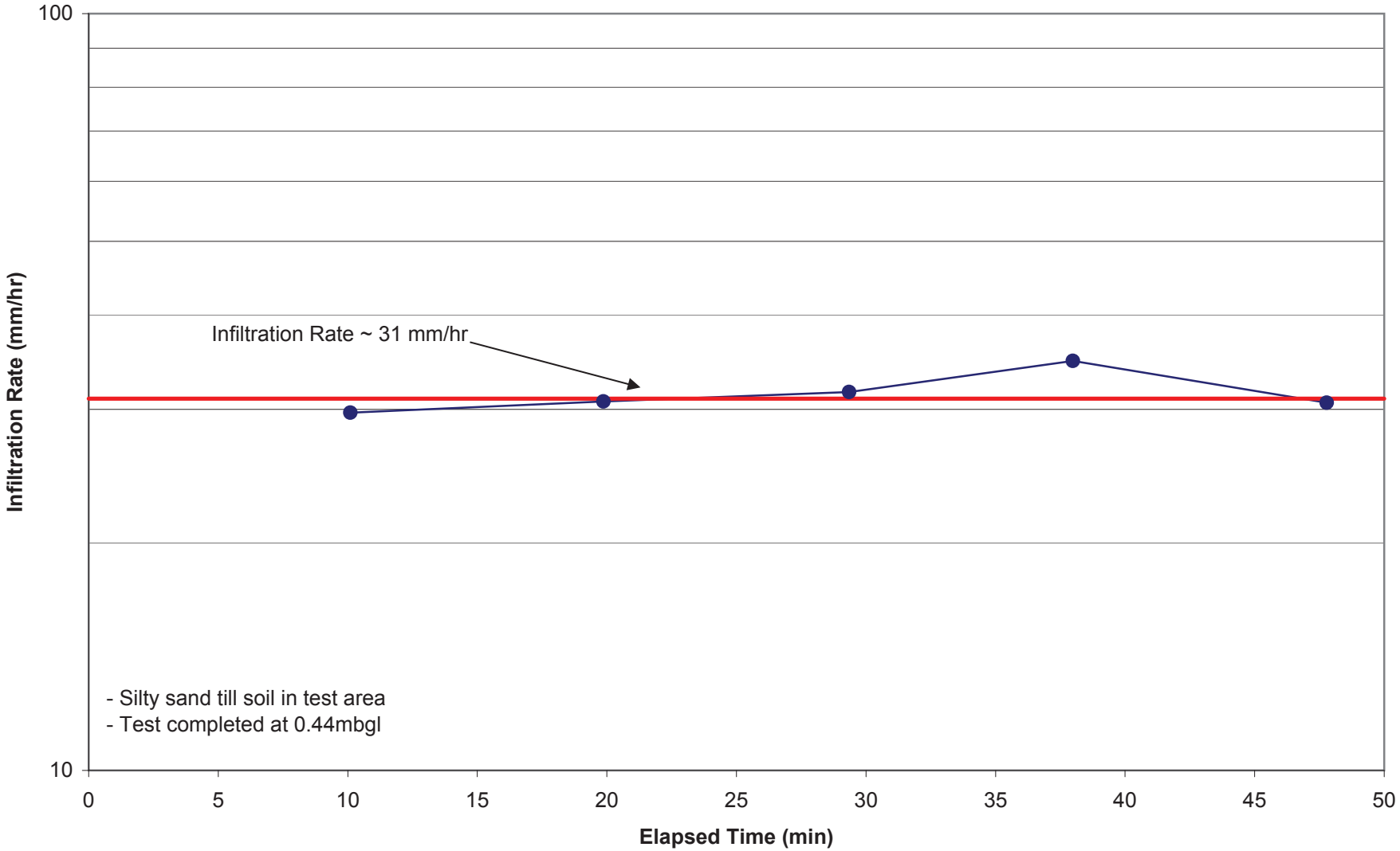
SEATON NEIGHBOURHOOD 20
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

INFILTRATION AND HYDRAULIC CONDUCTIVITY

BURNSIDE

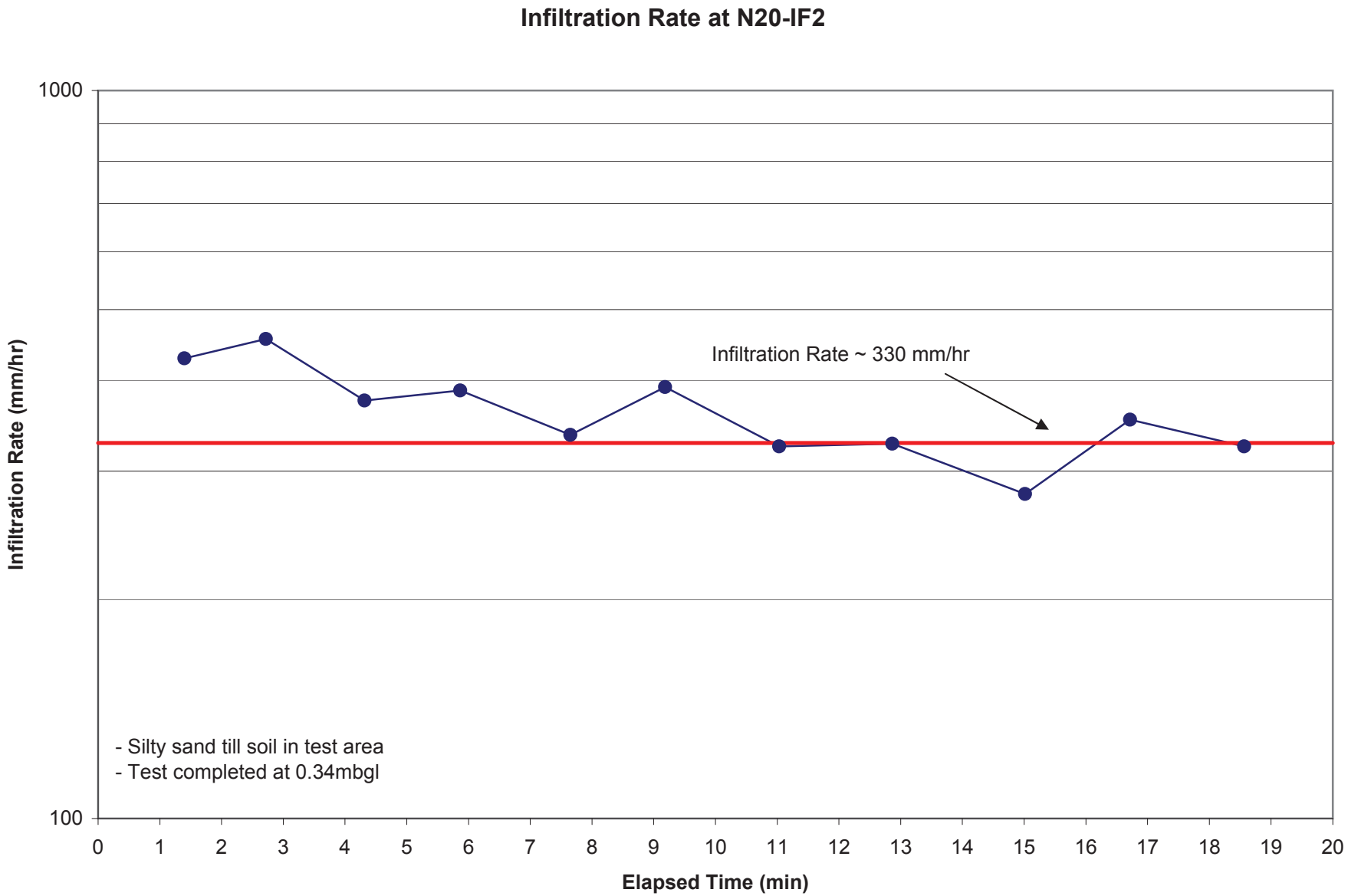
019912 HG STUDY DRAWING SET.dwg

Infiltration Rate at N20-IF1



PEN019912

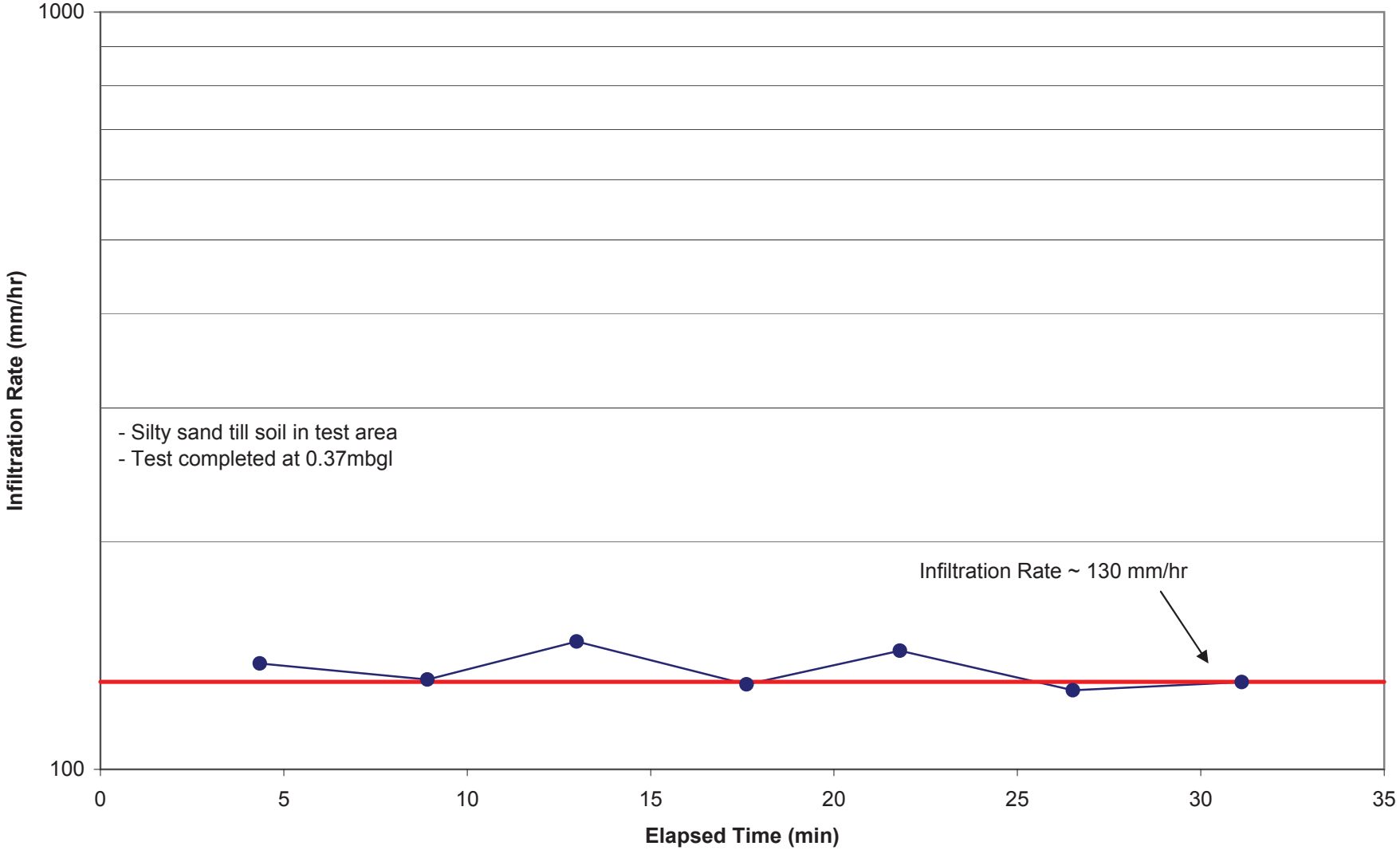
Figure N20-F2



PEN019912

Figure N20-F3

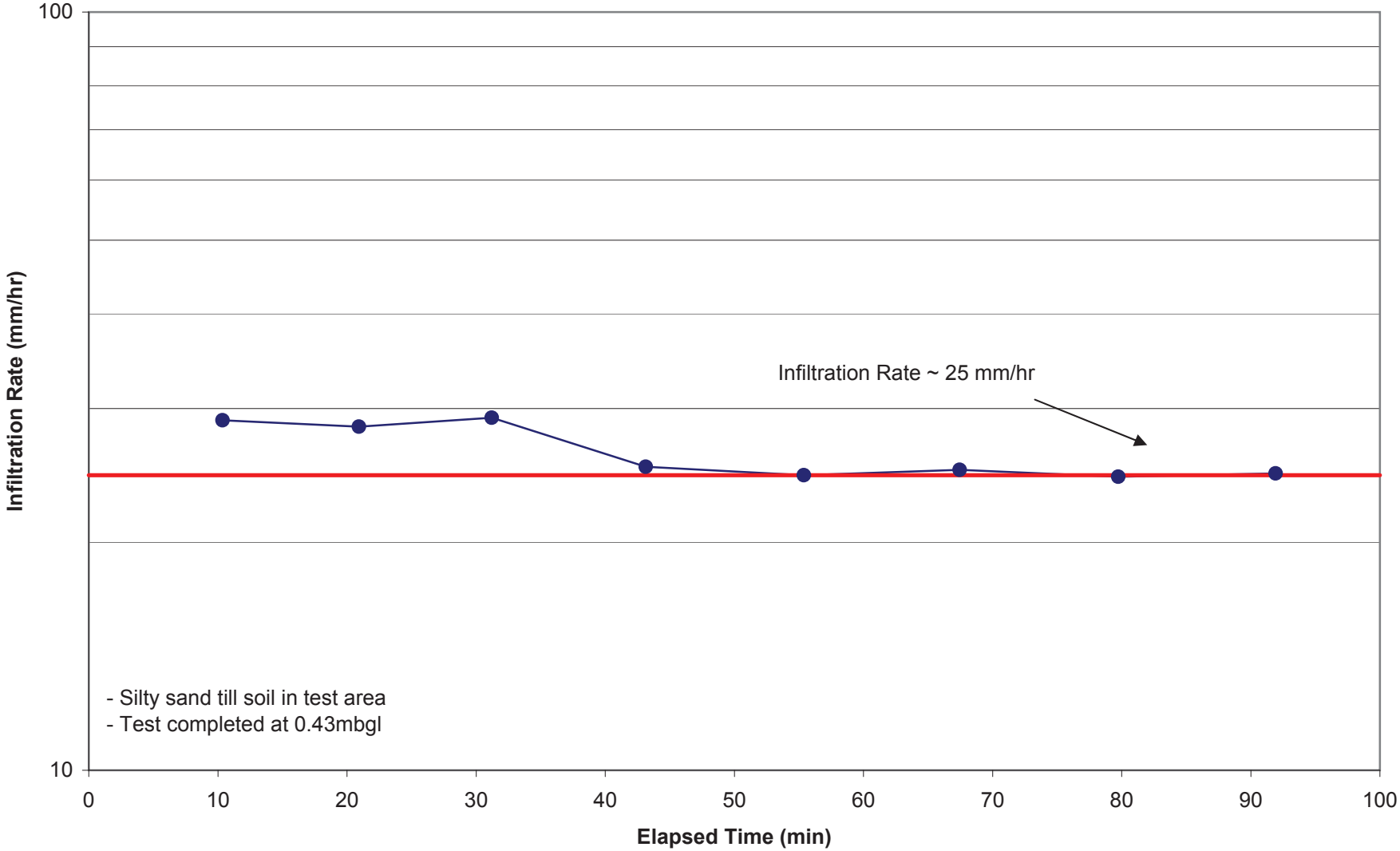
Infiltration Rate at N20-IF3



PEN019912

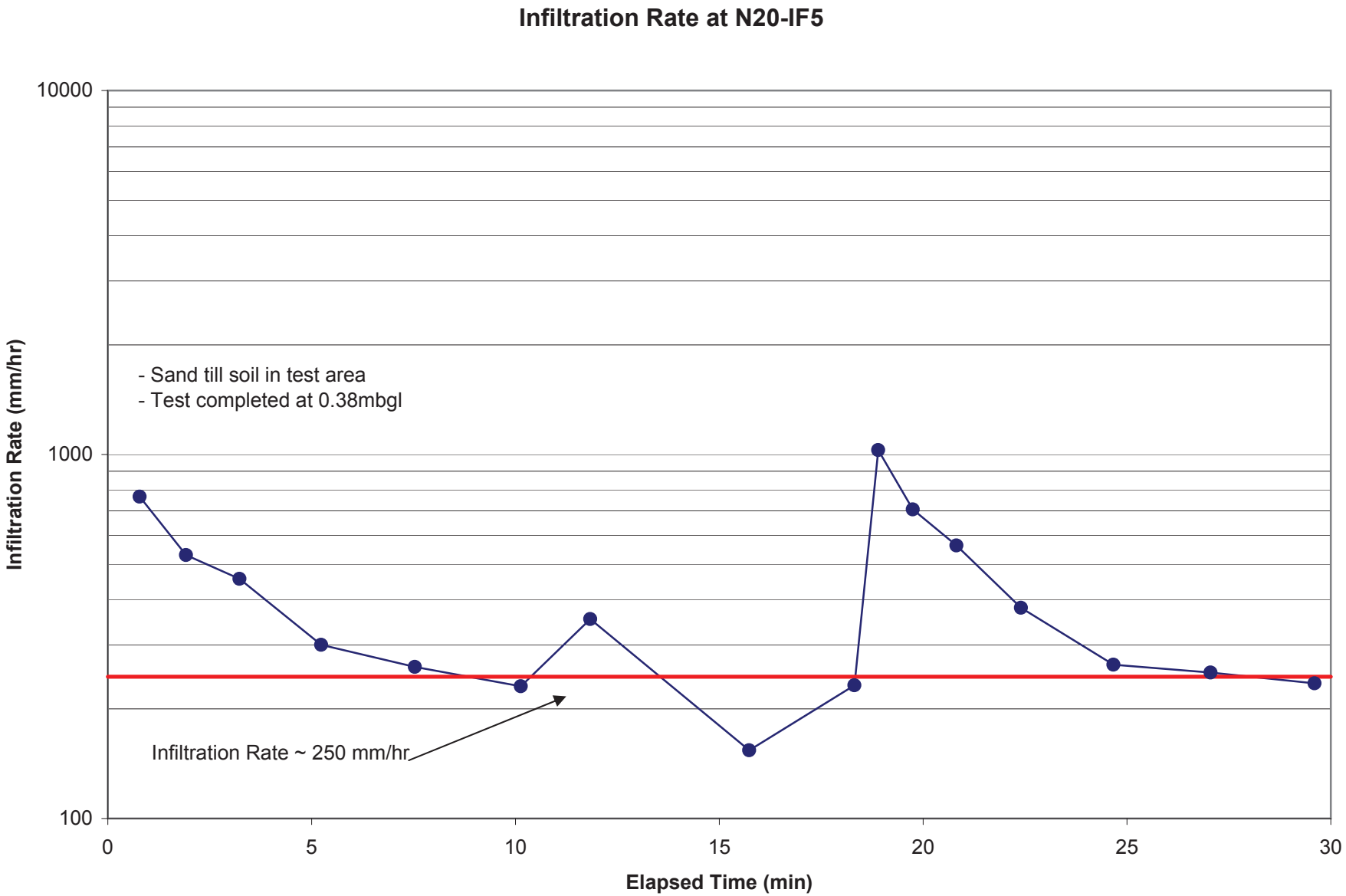
Figure N20-F4

Infiltration Rate at N20-IF4



PEN019912

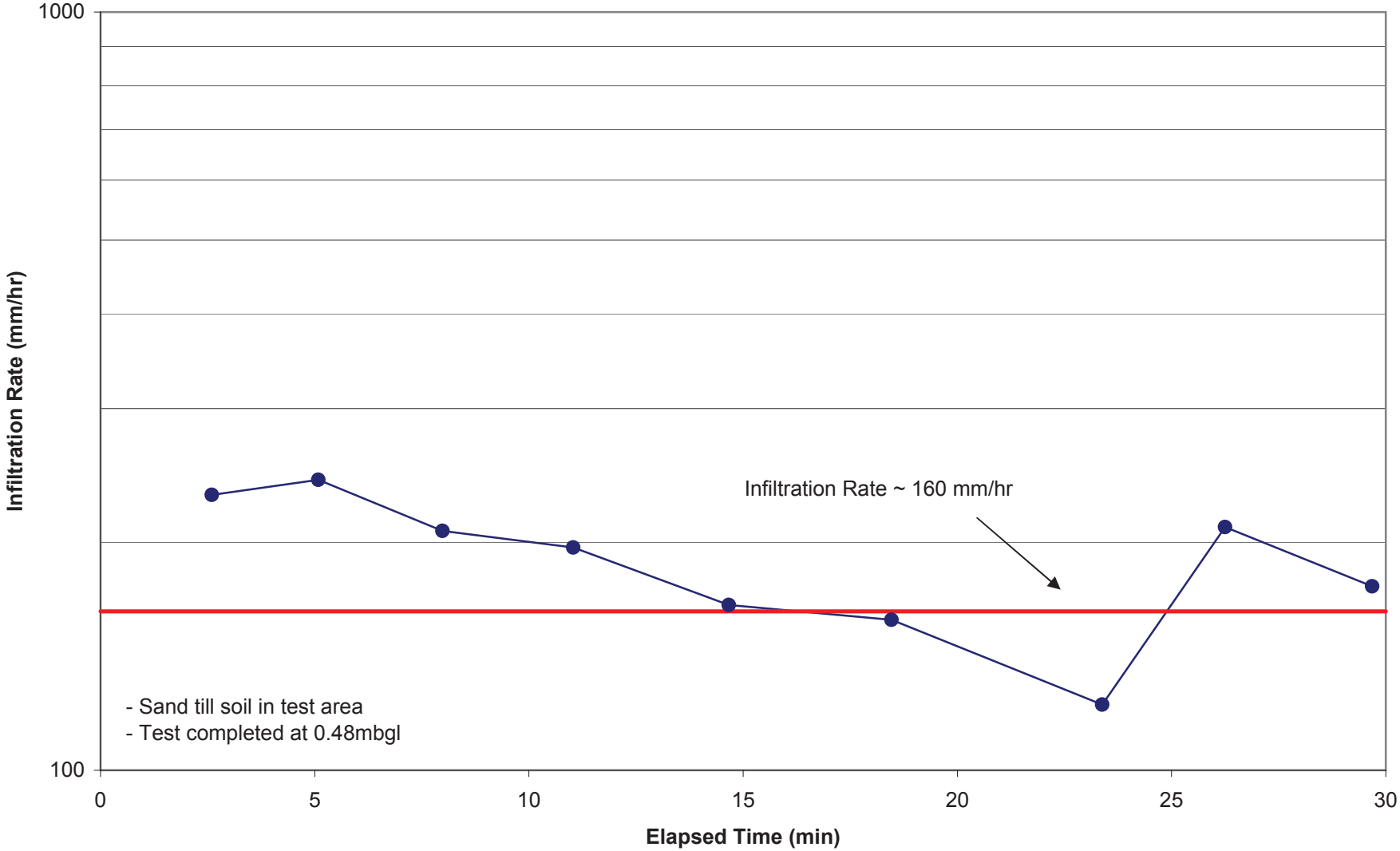
Figure N20-F5



PEN019912

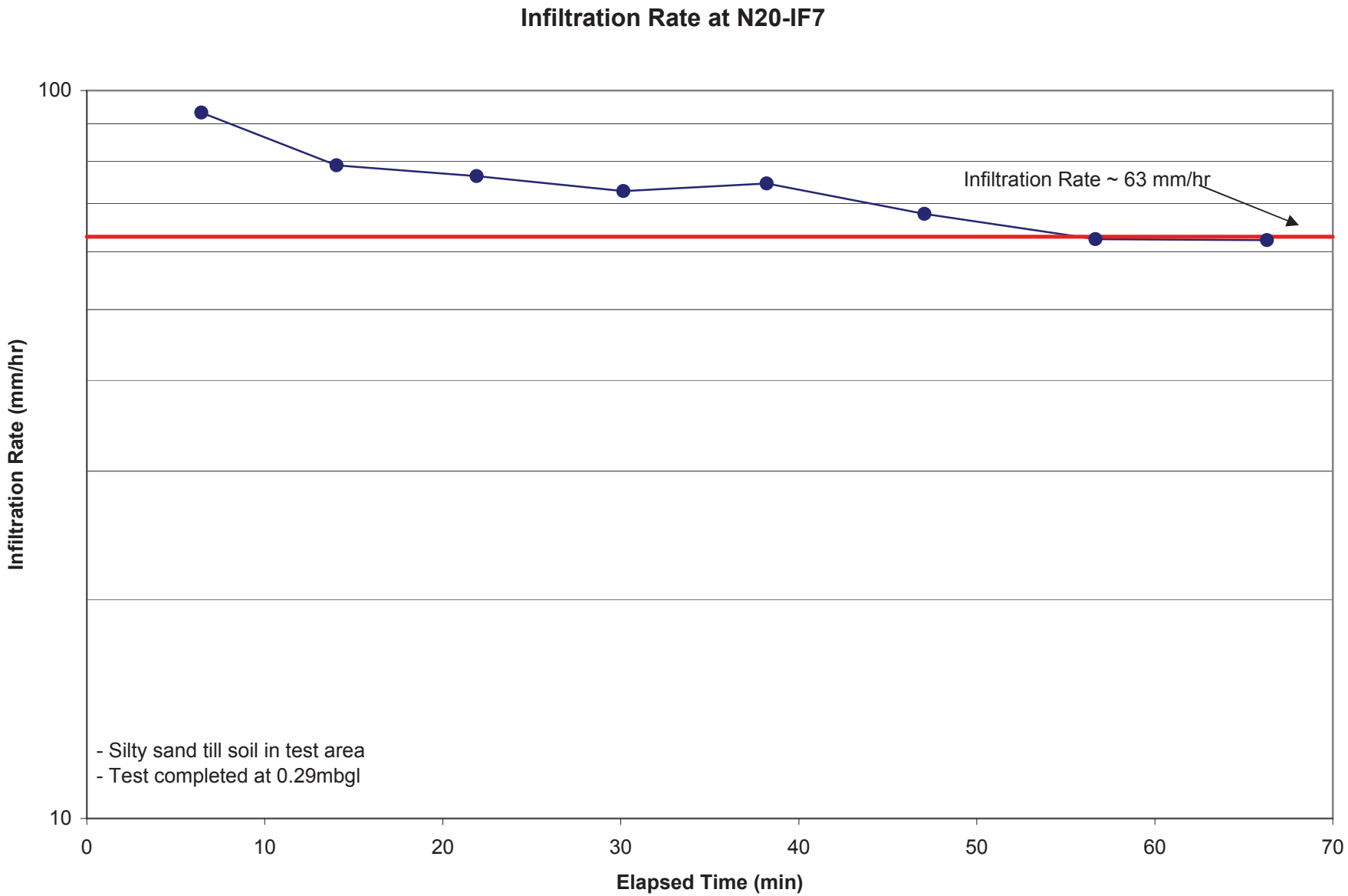
Figure N20-F6

Infiltration Rate at N20-IF6



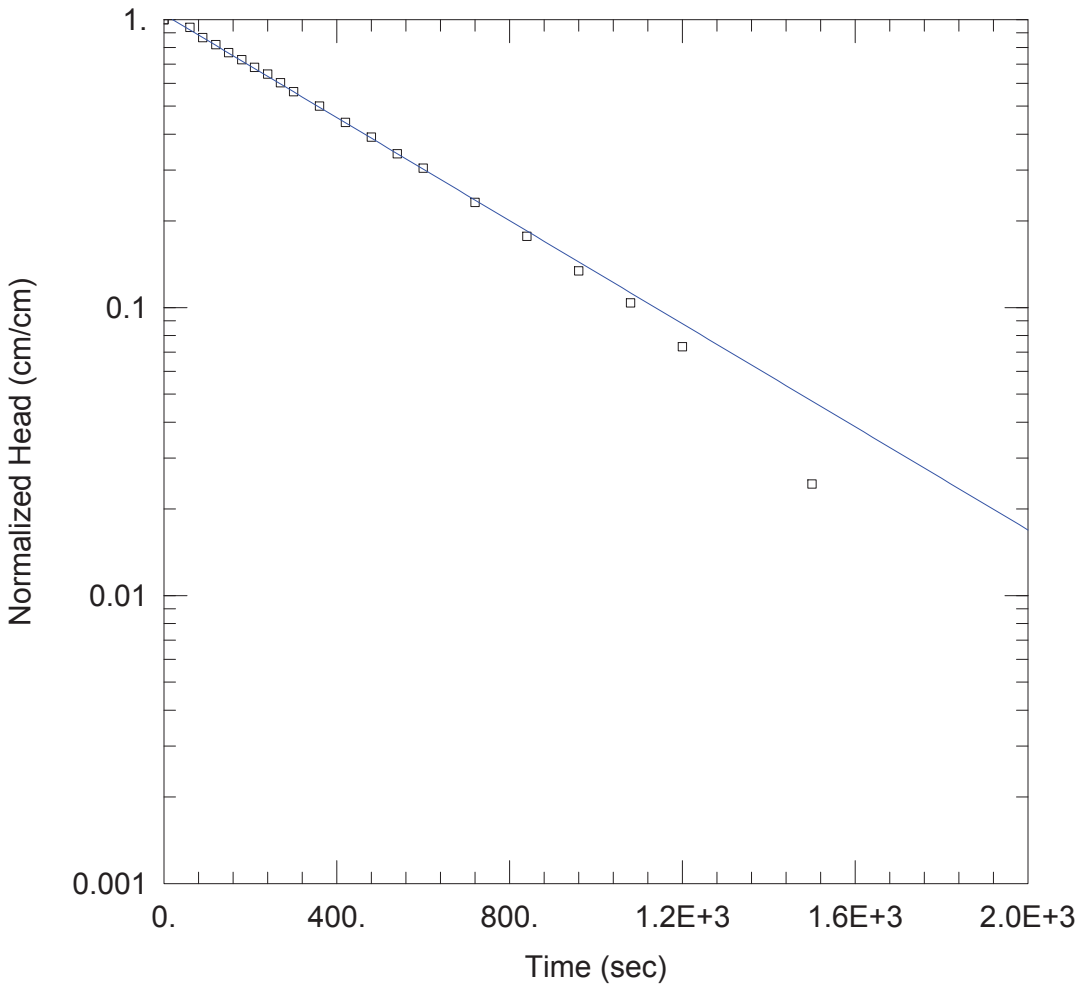
PEN019912

Figure N20-F7



PEN019912

Figure N20-F8



HYDRAULIC CONDUCTIVITY TEST AT MW1-16

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW1-16
Test Date: May 5, 2011

AQUIFER DATA

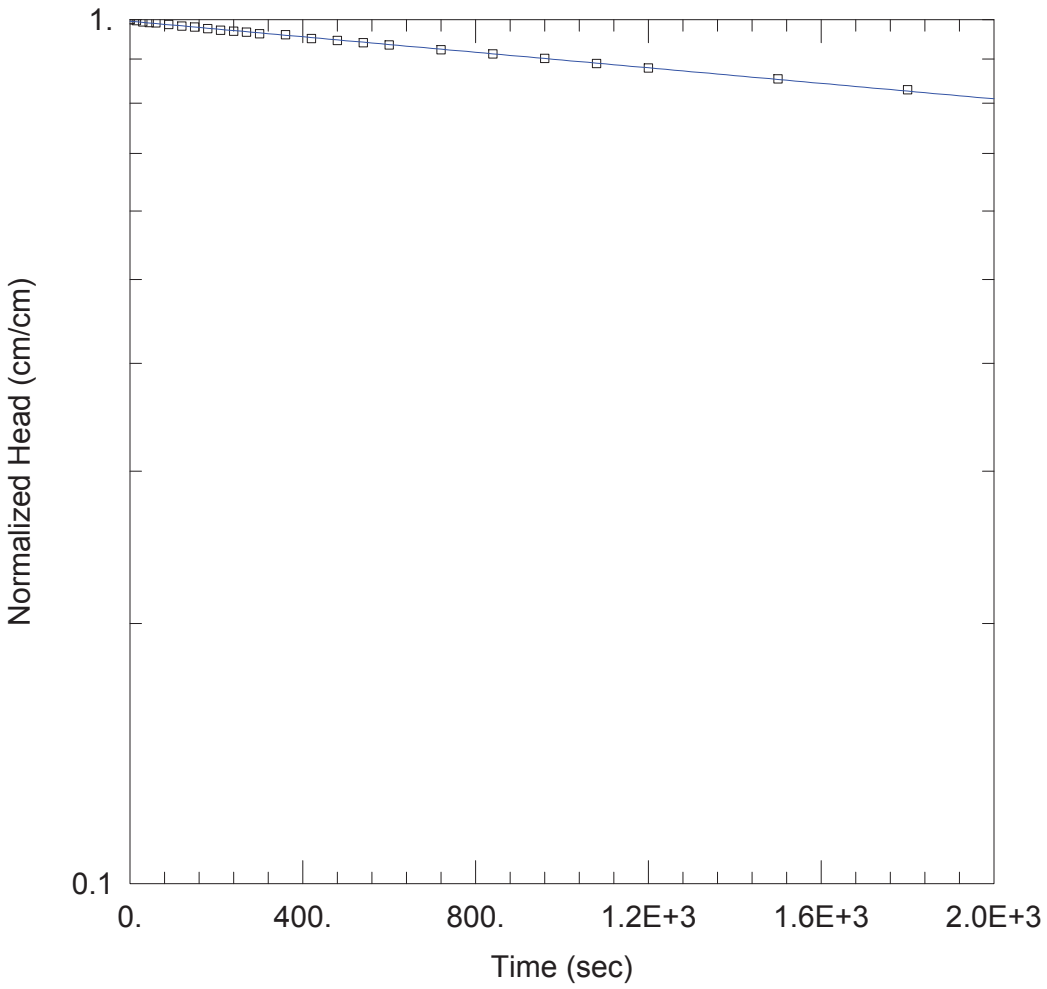
Saturated Thickness: 199. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1-16)

Initial Displacement: 82. cm
Total Well Penetration Depth: 199. cm
Casing Radius: 2.54 cm
Static Water Column Height: 199. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001052 cm/sec
y0 = 85.36 cm



HYDRAULIC CONDUCTIVITY TEST AT MW1-19

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW1-19
Test Date: May 4, 2011

AQUIFER DATA

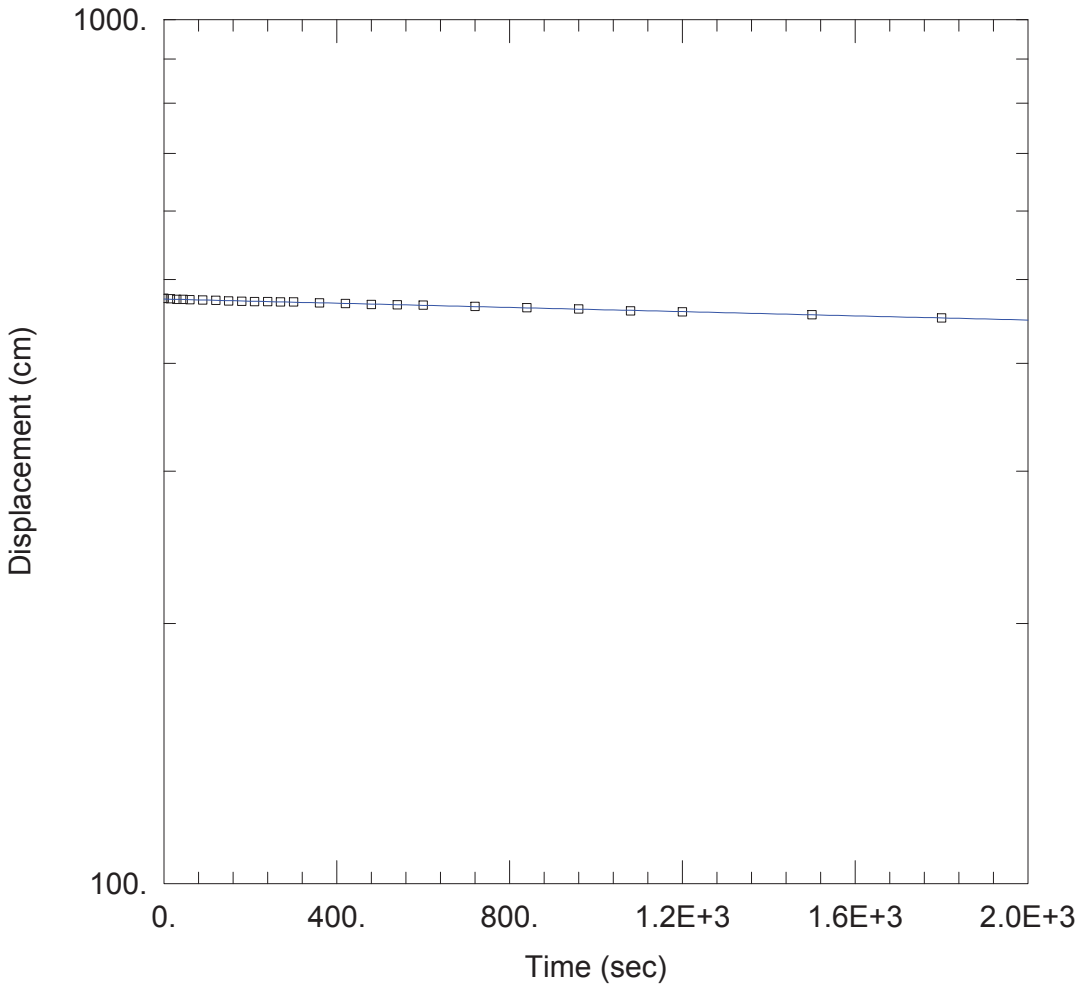
Saturated Thickness: 589. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1-19)

Initial Displacement: 375.5 cm
Total Well Penetration Depth: 589. cm
Casing Radius: 2.54 cm
Static Water Column Height: 589. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.604E-6 cm/sec
y0 = 373.8 cm



HYDRAULIC CONDUCTIVITY TEST AT MW1-21

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW1-21
Test Date: May 5, 2011

AQUIFER DATA

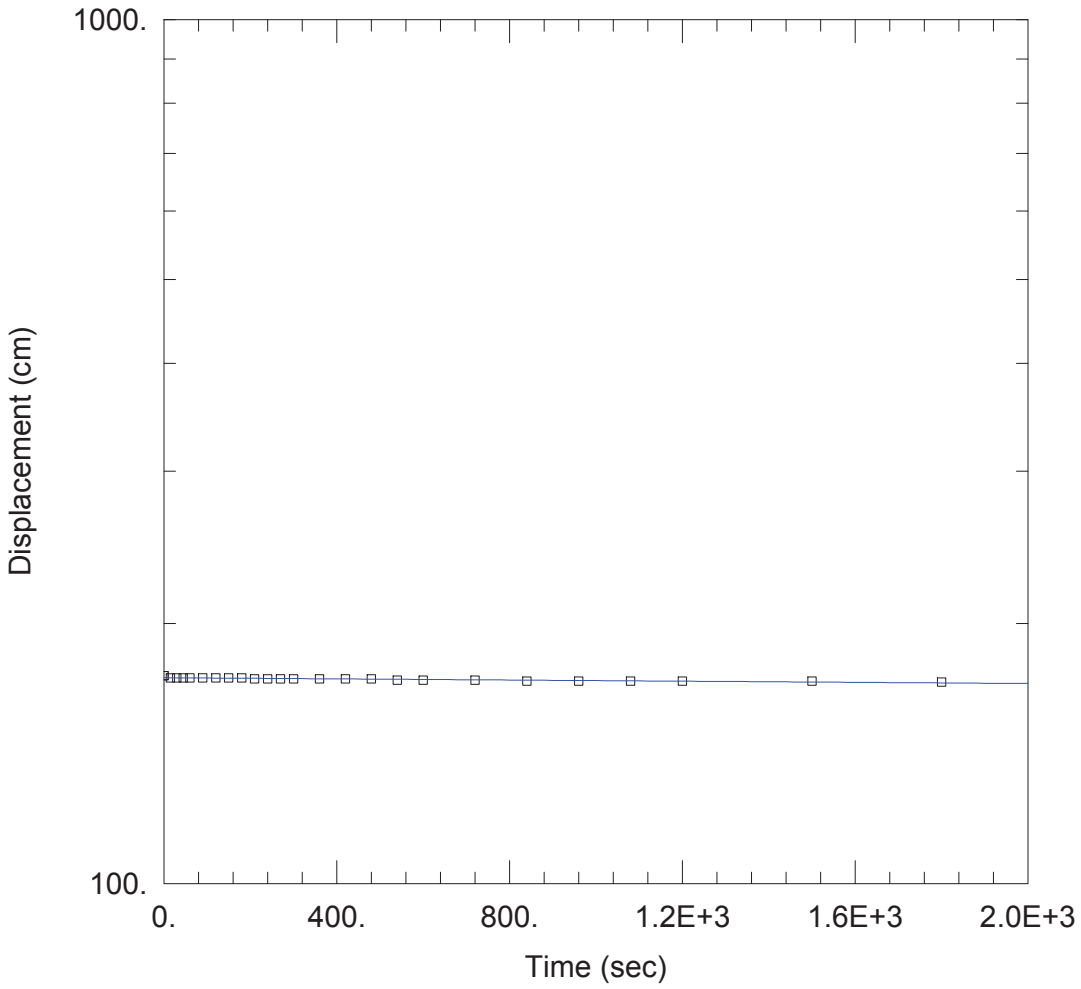
Saturated Thickness: 713.5 cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1-21)

Initial Displacement: 475.5 cm
Total Well Penetration Depth: 713.5 cm
Casing Radius: 2.54 cm
Static Water Column Height: 713.5 cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.848E-6 cm/sec
y0 = 474.8 cm



HYDRAULIC CONDUCTIVITY TEST AT MW11-10-1S

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW11-10-1s
Test Date: Aug. 12, 2011

AQUIFER DATA

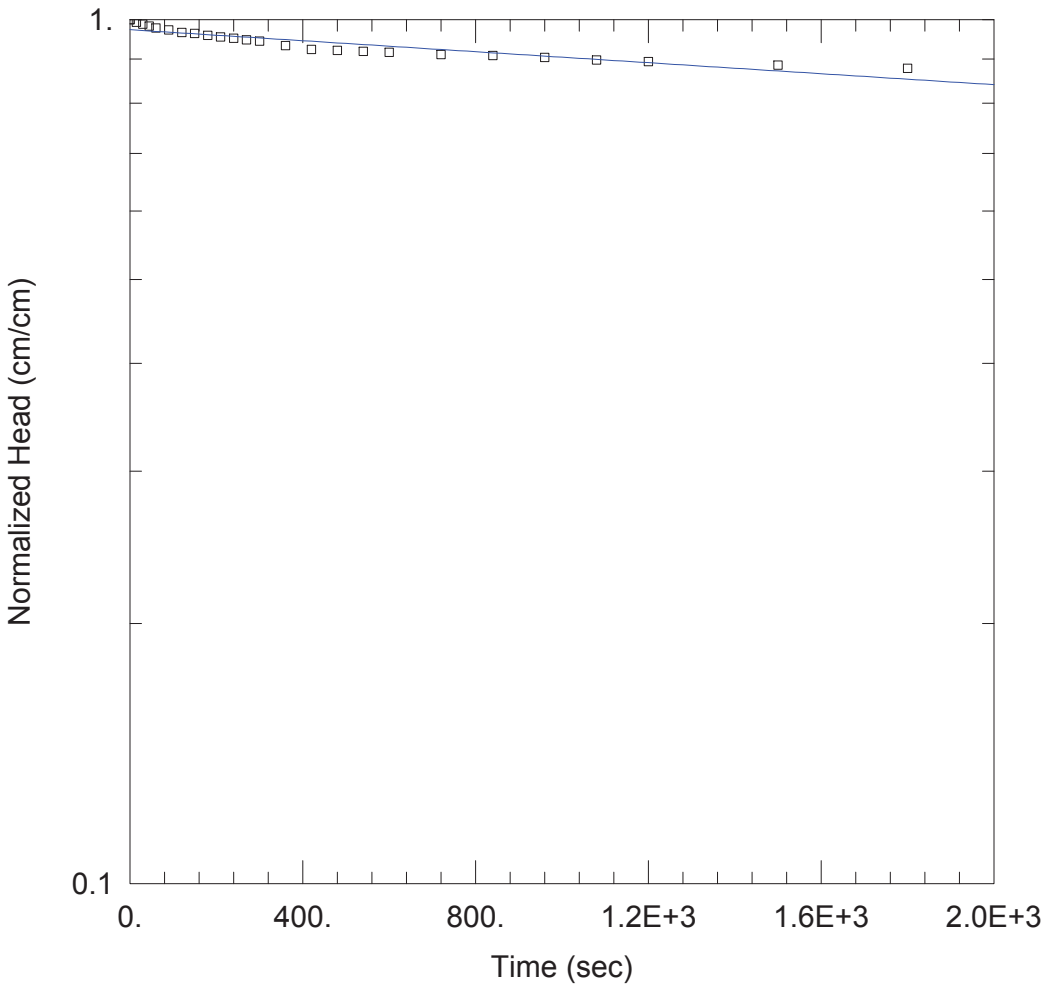
Saturated Thickness: 296. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW11-10-1s)

Initial Displacement: 174. cm
Total Well Penetration Depth: 296. cm
Casing Radius: 2.54 cm
Static Water Column Height: 296. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 6.043E-7 cm/sec
y0 = 173. cm



HYDRAULIC CONDUCTIVITY TEST AT MW11-10-1D

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW11-10-1d
Test Date: Aug. 12, 2011

AQUIFER DATA

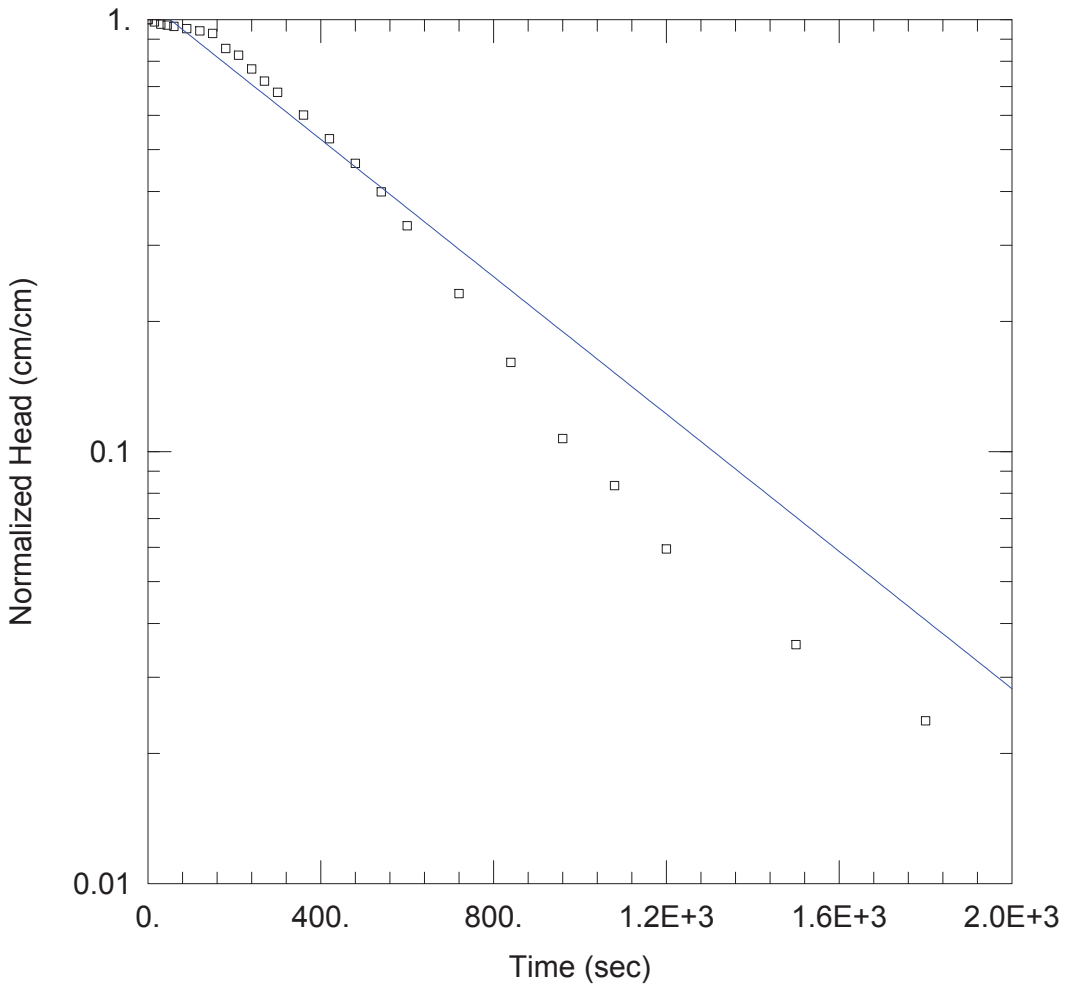
Saturated Thickness: 783. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW11-10-1d)

Initial Displacement: 602.5 cm
Total Well Penetration Depth: 783. cm
Casing Radius: 2.54 cm
Static Water Column Height: 783. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 5.789E-6 cm/sec
y0 = 586.3 cm



HYDRAULIC CONDUCTIVITY TEST AT MW11-11-1

PROJECT INFORMATION

Project: PEN019912 N20
Location: North Pickering
Test Well: MW11-11-1
Test Date: Aug. 12, 2011

AQUIFER DATA

Saturated Thickness: 130. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW11-11-1)

Initial Displacement: 84. cm
Total Well Penetration Depth: 130. cm
Casing Radius: 2.54 cm
Static Water Column Height: 130. cm
Screen Length: 130. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0002406 cm/sec
y0 = 92.16 cm

Memorandum

Date:	April 1, 2021		
To:	Mr. Sameh George, The Regional Municipality of Durham	From:	Stacy Meek
Project Name:	Proposed Pickering EMS Facility – Northwest Corner of Concession Road 5 and Sideline 16, Pickering, ON	Project #:	BRM-00604892-B0
Subject:	Water Level Measurements		
Distribution:	Mr. Sameh George – The Regional Municipality of Durham		

Re: Water Level Measurements
Northwest Corner of Concession Road 5 and Sideline 16, Pickering, ON

As requested, please find enclosed the water level measurements in the existing monitoring wells (i.e. BH/MW1, BH/MW3, BH/MW9, BH/MW13, BH/MW15, BH/MW101, BH/MW102 and BH/MW103) present on the northwest corner of Concession Road 5 and Sideline 16, Pickering, Ontario.

Should you require further information, please do not hesitate to contact EXP.

Submitted by:

Stacy Meek, P.Eng.
Senior Project Manager

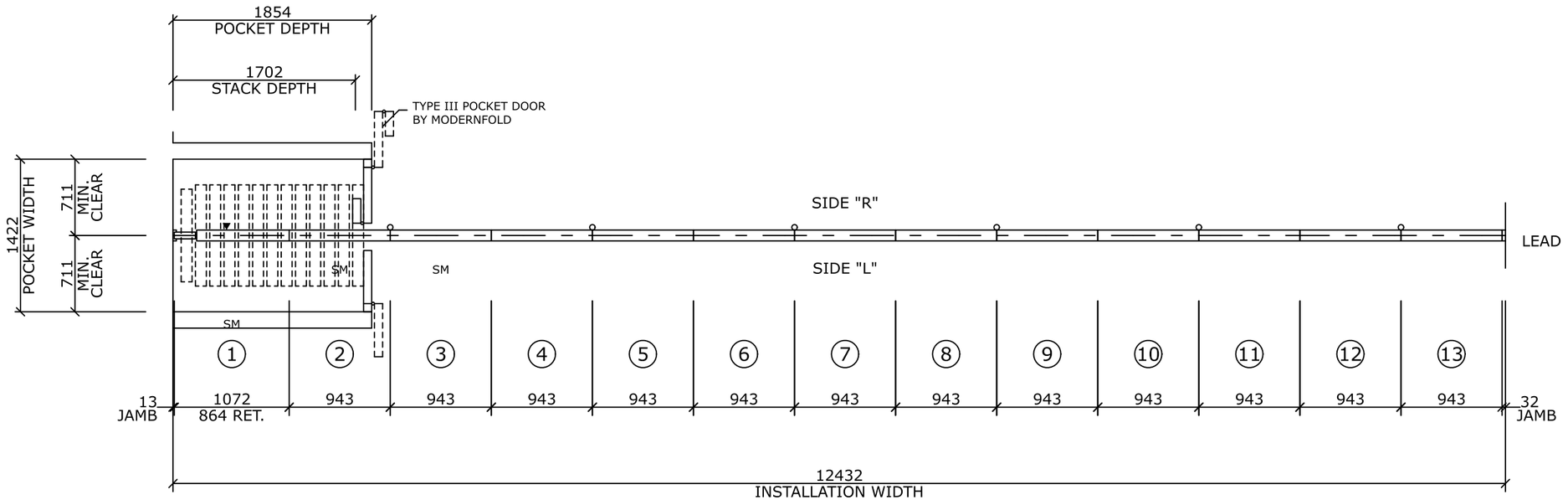
Encl: Summary of Water Levels Measured

220 Commerce Valley Drive West, Suite 110, Markham ON, L3T 0A8
T: +1.905.695.3217 • www.exp.com

Table 1: Summary of Water Levels Measured

Monitoring Well	September 5, 2018		September 6, 2018		September 11, 2018	
	Depth to Water (mbgs)	Elevation (masl)	Depth to Water (mbgs)	Elevation (masl)	Depth to Water (mbgs)	Elevation (masl)
BH/MW1	3.79	147.09	3.81	147.07	3.81	147.07
BH/MW3	Dry	N/A	2.99	148.34	2.93	148.40
BH/MW9	-	N/A	3.62	148.94	3.16	149.40
BH/MW13	2.21	148.59	2.26	148.54	2.39	148.41
BH/MW15	-	N/A	2.68	150.37	2.37	150.68
BH/MW101	1.29	148.28	1.22	148.35	1.08	148.49
BH/MW102	0.90	148.86	0.91	148.85	0.33	149.43
BH/MW103	1.56	149.53	1.75	149.34	1.80	149.29

Monitoring Well	September 12, 2018		September 20, 2018		March 30, 2021	
	Depth to Water (mbgs)	Elevation (masl)	Depth to Water (mbgs)	Elevation (masl)	Depth to Water (mbgs)	Elevation (masl)
BH/MW1	3.80	147.08	3.84	147.04	4.21	146.67
BH/MW3	2.54	148.79	2.92	148.41	Dry	N/A
BH/MW9	2.73	149.83	2.87	149.69	3.71	148.85
BH/MW13	2.40	148.40	2.54	148.26	2.09	148.71
BH/MW15	2.39	150.66	2.52	150.53	2.57	150.48
BH/MW101	1.03	148.54	1.38	148.19	0.72	148.85
BH/MW102	0.48	149.28	0.93	148.83	0.02	149.74
BH/MW103	1.90	149.19	1.91	149.18	1.60	149.50



ARCHITECT / GENERAL CONTRACTOR NOTES

1. MINIMUM DIMENSIONS PROVIDE FOR CLEARANCE FROM ALL ADJACENT CONSTRUCTION / FIXTURES FOR ADJUSTMENT, OPERATION, AND SAFETY.
2. GENERAL CONTRACTORS SHALL BE RESPONSIBLE FOR ALL STRUCTURAL SUPPORT, ADJOINING CONSTRUCTION AND TRIM.
3. WALL CONSTRUCTION AT JAMBS MUST BE ADEQUATE FOR SECURING JAMBS, AND WITHSTANDING FOR EXERTED BY EXPANDABLE PANEL.
4. SM INDICATES SureSet™ MANUAL BOTTOM SEALS.
   ▼ INDICATES OPERABLE PANEL & BOTTOM SEAL OPERATOR HOLE.

6. HINGE POINTS ARE SHOWN FOR DIAGRAMMATIC PURPOSES ONLY.

ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

PANEL LAYOUT
OP-01

CLOSURE METHOD	EXPANDABLE - 9"
TRAIL JAMB HEIGHT	2875
PANEL FABRICATION HEIGHT	2875
LEAD JAMB HEIGHT	2875
SUSPENSION SYSTEM	#17 HD BKT (4.5 OMT G)
BOTTOM SEALS	SURESET AUTOMATIC 2" (51MM)
PANEL ACOUSTICAL RATING	52 STC
HANGING WEIGHT	8.2 LBS./SQ.FT.
PANEL SKIN/FACING	STEEL
HINGE/TRIM COLOR	TO BE ADVISED/TO BE ADVISED
PANEL FINISH	HEAVY VINYL
PANEL FINISH COLOR	TO BE ADVISED

ACOUSTI-SEAL
ENCORE - PAIRED PANEL

MODERNFOLD®

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

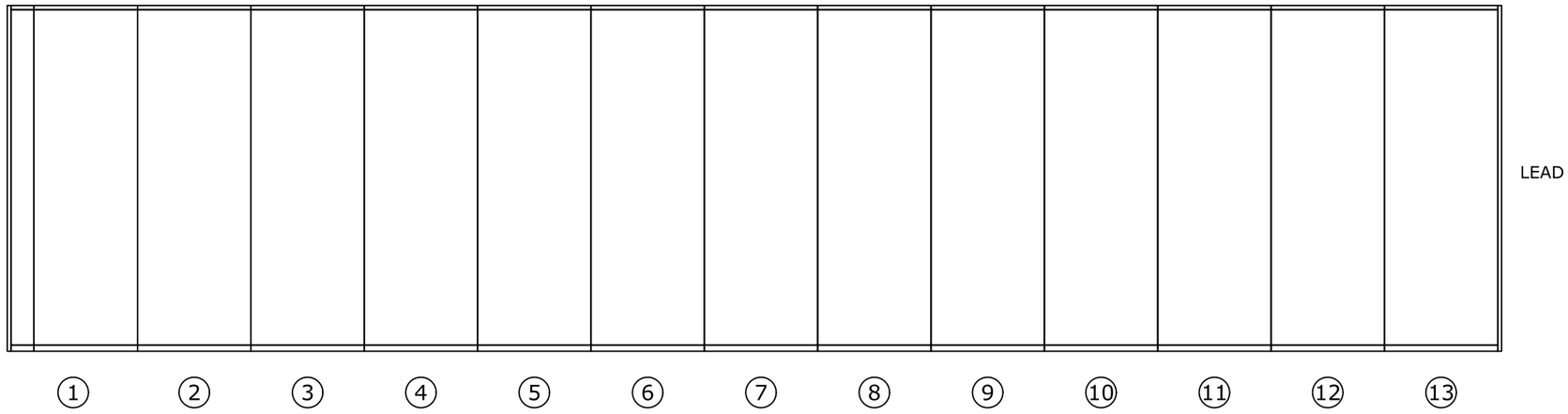
LOCATION: PICKERING, ON

ARCHITECT: AECOM

CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

DRAWING NO. A23494-01-D1 | ORDER NO: | SHEET: 1 OF 6



ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

ELEVATION LEFT
OP-01

CLOSURE METHOD	EXPANDABLE - 9"
TRAIL JAMB HEIGHT	2875
PANEL FABRICATION HEIGHT	2875
LEAD JAMB HEIGHT	2875
SUSPENSION SYSTEM	#17 HD BKT (4.5 OMT G)
BOTTOM SEALS	SURESET AUTOMATIC 2" (51MM)
PANEL ACOUSTICAL RATING	52 STC
HANGING WEIGHT	8.2 LBS./SQ.FT.
PANEL SKIN/FACING	STEEL
HINGE/TRIM COLOR	TO BE ADVISED/TO BE ADVISED
PANEL FINISH	HEAVY VINYL
PANEL FINISH COLOR	TO BE ADVISED

ACOUSTI-SEAL
ENCORE - PAIRED PANEL

MODERNFOLD

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

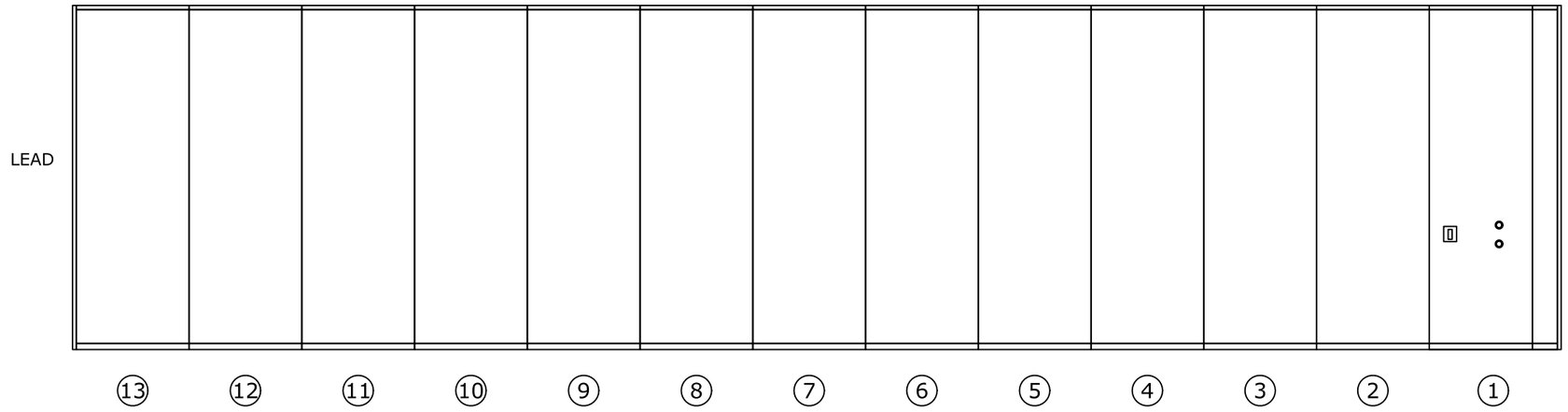
LOCATION: PICKERING, ON

ARCHITECT: AECOM

CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

DRAWING NO. A23494-01-D2 | ORDER NO: | SHEET: 2 OF 6



ELEVATION RIGHT
OP-01

CLOSURE METHOD	EXPANDABLE - 9"
TRAIL JAMB HEIGHT	2875
PANEL FABRICATION HEIGHT	2875
LEAD JAMB HEIGHT	2875
SUSPENSION SYSTEM	#17 HD BKT (4.5 OMT G)
BOTTOM SEALS	SURESET AUTOMATIC 2" (51MM)
PANEL ACOUSTICAL RATING	52 STC
HANGING WEIGHT	8.2 LBS./SQ.FT.
PANEL SKIN/FACING	STEEL
HINGE/TRIM COLOR	TO BE ADVISED/TO BE ADVISED
PANEL FINISH	HEAVY VINYL
PANEL FINISH COLOR	TO BE ADVISED

ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

ACOUSTI-SEAL
ENCORE - PAIRED PANEL

MODERNFOLD

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

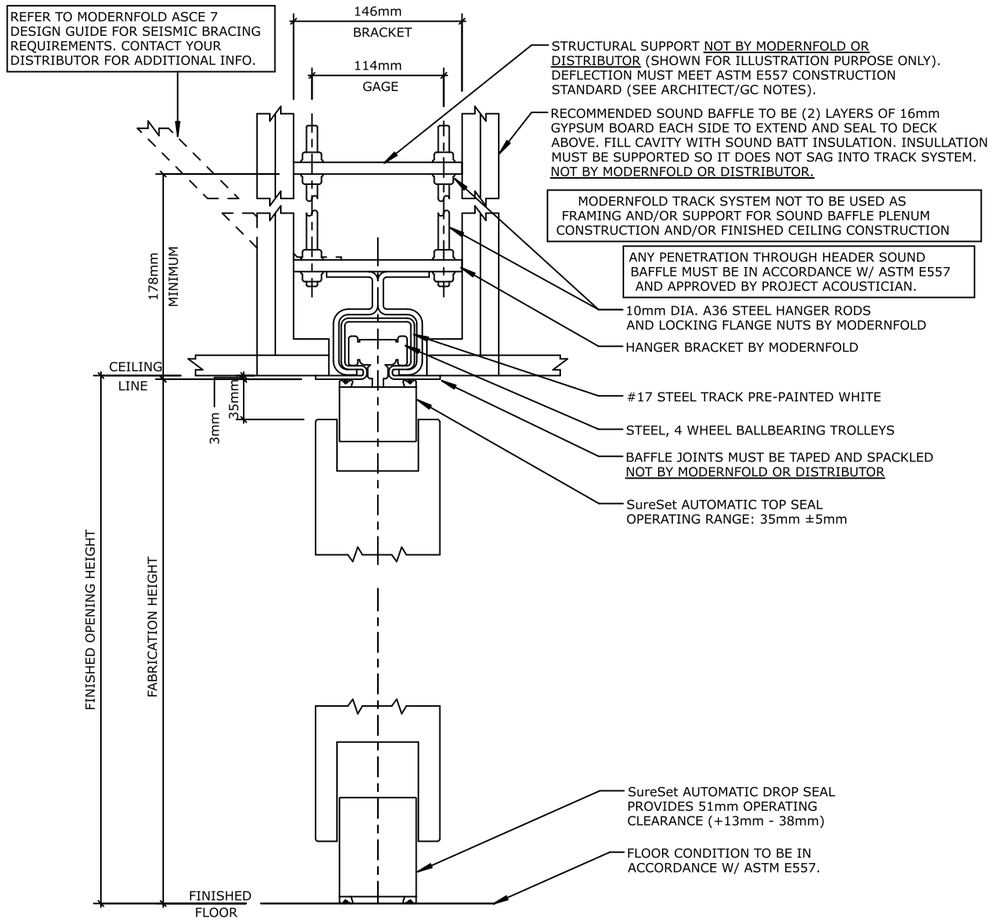
LOCATION: PICKERING, ON

ARCHITECT: AECOM

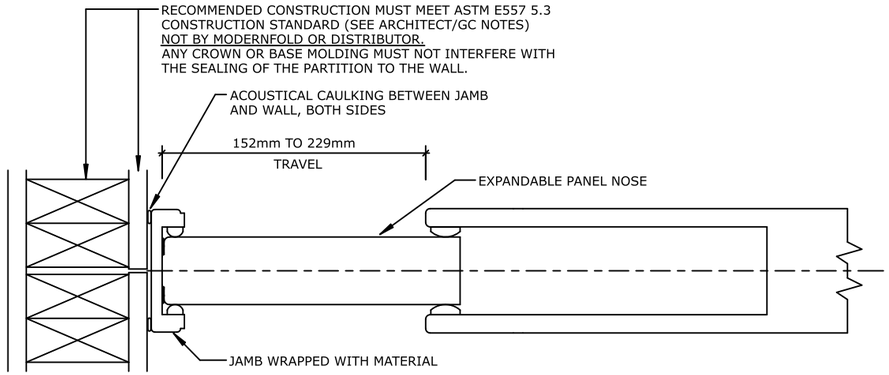
CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

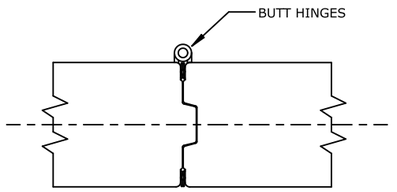
DRAWING NO. A23494-01-D3 | ORDER NO: | SHEET: 3 OF 6



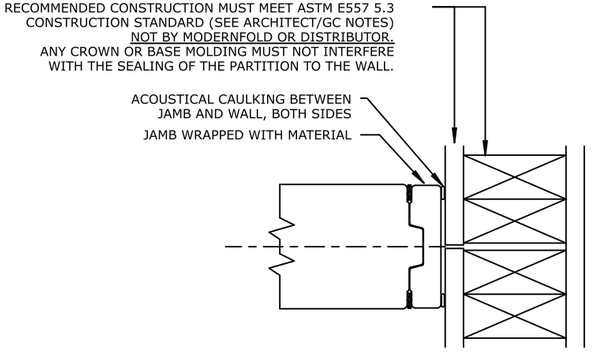
VERTICAL SECTION



EXPANDABLE PANEL W/ JAMB



HINGE PANEL JOINT



JAMB

ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

DETAIL SHEET OP-01

CLOSURE METHOD	EXPANDABLE - 9"
TRAIL JAMB HEIGHT	2875
PANEL FABRICATION HEIGHT	2875
LEAD JAMB HEIGHT	2875
SUSPENSION SYSTEM	#17 HD BKT (4.5 OMT G)
BOTTOM SEALS	SURESET AUTOMATIC 2" (51MM)
PANEL ACOUSTICAL RATING	52 STC
HANGING WEIGHT	8.2 LBS./SQ.FT.
PANEL SKIN/FACING	STEEL
HINGE/TRIM COLOR	TO BE ADVISED/TO BE ADVISED
PANEL FINISH	HEAVY VINYL
PANEL FINISH COLOR	TO BE ADVISED

ACOUSTI-SEAL ENCORE - PAIRED PANEL

MODERNFOLD

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

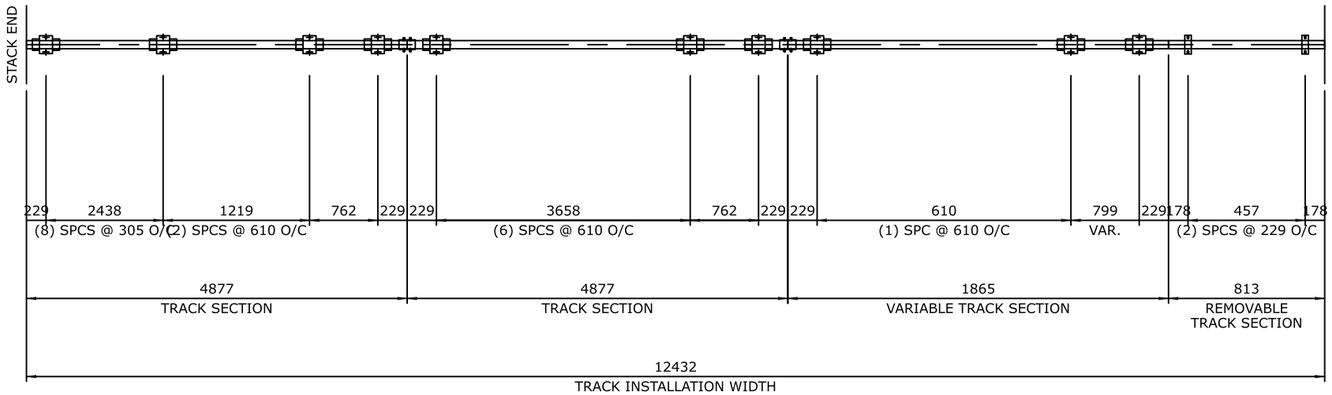
LOCATION: PICKERING, ON

ARCHITECT: AECOM

CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

DRAWING NO. A23494-01-D4 | ORDER NO: | SHEET: 4 OF 6



#17 BRACKET LEGEND

- STANDARD BRACKETS
- HEAVY DUTY BRACKETS
- EXTRA LONG HEAVY DUTY BRACKETS
- REMOVABLE BRACKETS
- SPLICE BRACKETS

NOTES:

1. PUNCH OR DRILL 11 DIA. HOLES, 57 EACH SIDE OF CENTERLINE, 114 GAGE, AT ALL LOCATIONS, AS NOTED.
2. OMIT RODS AND NUTS

ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

TRACK LAYOUT
OP-01

CLOSURE METHOD	EXPANDABLE - 9"
TRAIL JAMB HEIGHT	2875
PANEL FABRICATION HEIGHT	2875
LEAD JAMB HEIGHT	2875
SUSPENSION SYSTEM	#17 HD BKT (4.5 OMT G)
BOTTOM SEALS	SURESET AUTOMATIC 2" (51MM)
PANEL ACOUSTICAL RATING	52 STC
HANGING WEIGHT	8.2 LBS./SQ.FT.
PANEL SKIN/FACING	STEEL
HINGE/TRIM COLOR	TO BE ADVISED/TO BE ADVISED
PANEL FINISH	HEAVY VINYL
PANEL FINISH COLOR	TO BE ADVISED

ACOUSTI-SEAL
ENCORE - PAIRED PANEL

MODERNFOLD

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
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	5		
	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

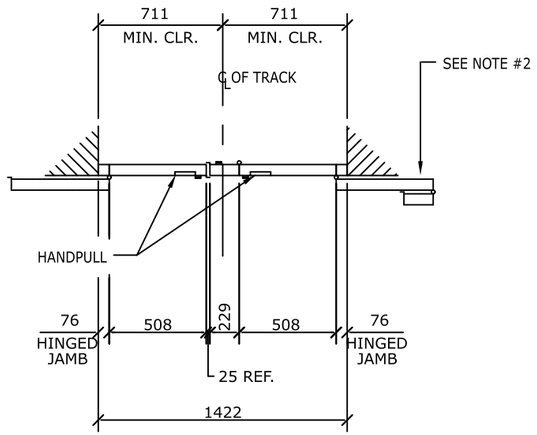
LOCATION: PICKERING, ON

ARCHITECT: AECOM

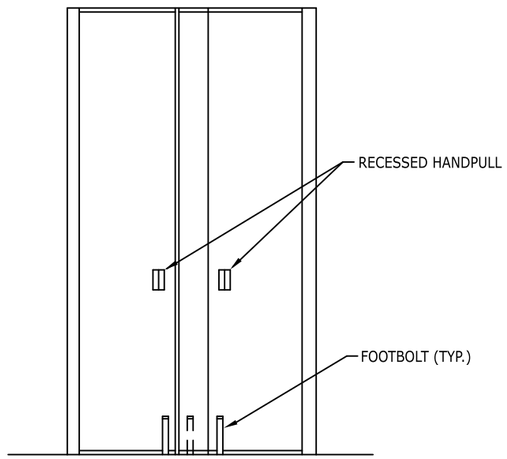
CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

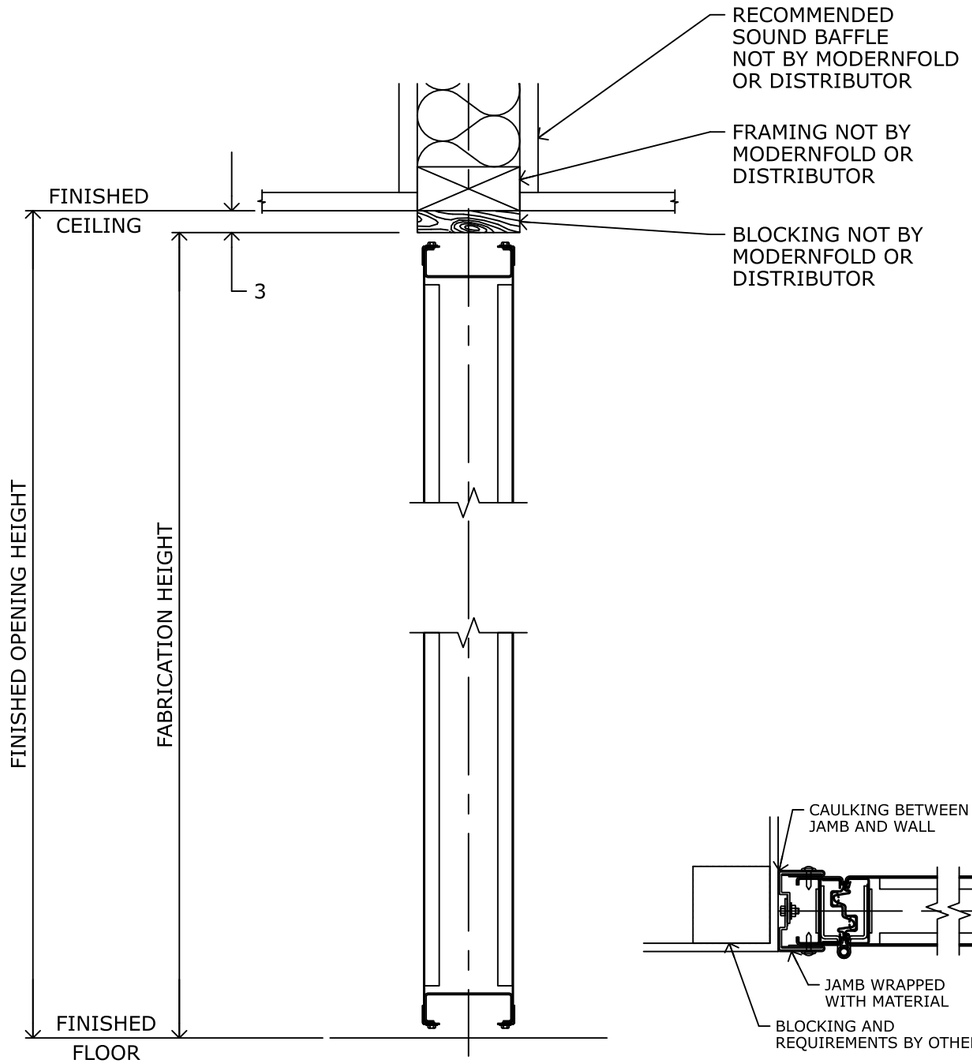
DRAWING NO. A23494-01-D5 | ORDER NO: | SHEET: 5 OF 6

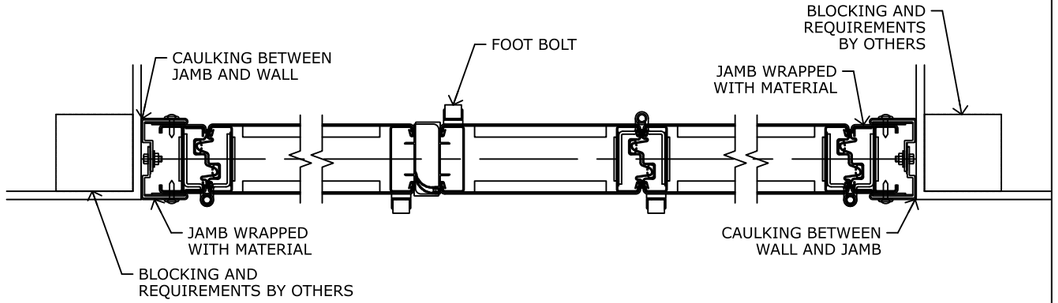


PLAN VIEW



ELEVATION





HINGED JAMB **HINGED CENTER PANEL** **HINGED JAMB**

NOTES:

1. WALL CONSTRUCTION AT JAMBS MUST BE ADEQUATE FOR SECURING JAMBS AND/OR SUPPORT OF HINGED PANELS.
2. WALLS MUST BE FREE OF OBSTRUCTIONS TO PERMIT DOORS TO SWING 180°. TYPICAL BOTH DOORS
3. HINGE POINT IS SHOWN FOR DIAGRAMMATIC PURPOSE ONLY.

ALL DIMENSIONS SHOWN IN MM UNLESS OTHERWISE NOTED.

POCKET DOOR
OP-01

PANEL FABRICATION HEIGHT	2875 (113.1875")
BOTTOM SEAL	NO
STC	NON RATED STC
SKIN	STEEL
HINGE	TO BE ADVISED
TRIM	TO BE ADVISED
PANEL FINISH	HEAVY VINYL
COLOR	TO BE ADVISED

POCKET DOOR
LEGACY - TYPE III

MODERNFOLD

DATE	REV	ISSUED FOR	DRN.
11/30/21	0	APPROVAL	MPM
	1		
	2		
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	6		
	7		
	8		

JOB NAME: SEATON PARAMEDIC STATION AND TRAINING FACILITY

-

LOCATION: PICKERING, ON

ARCHITECT: AECOM

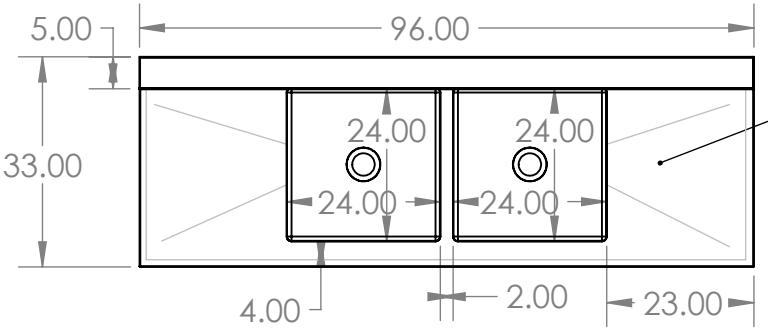
CONTRACTOR: -

DISTRIBUTOR: BRAVURA GROUP - TORONTO

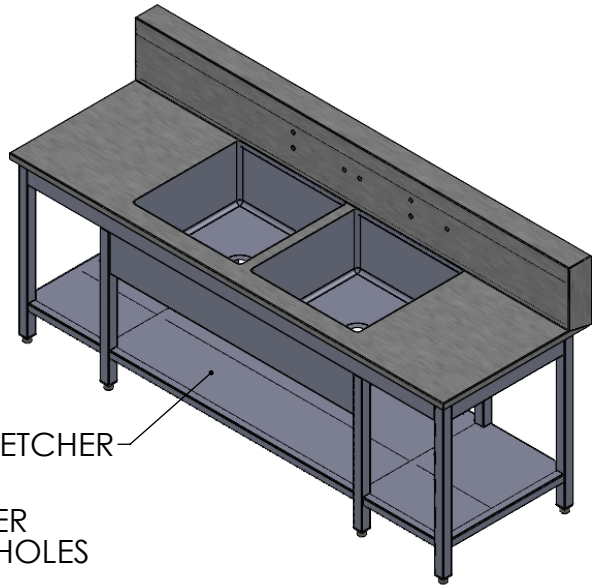
DRAWING NO. A23494-01-D6 | ORDER NO: | SHEET: 6 OF 6

1) Coordinate holes for plumbing with supplied fixture

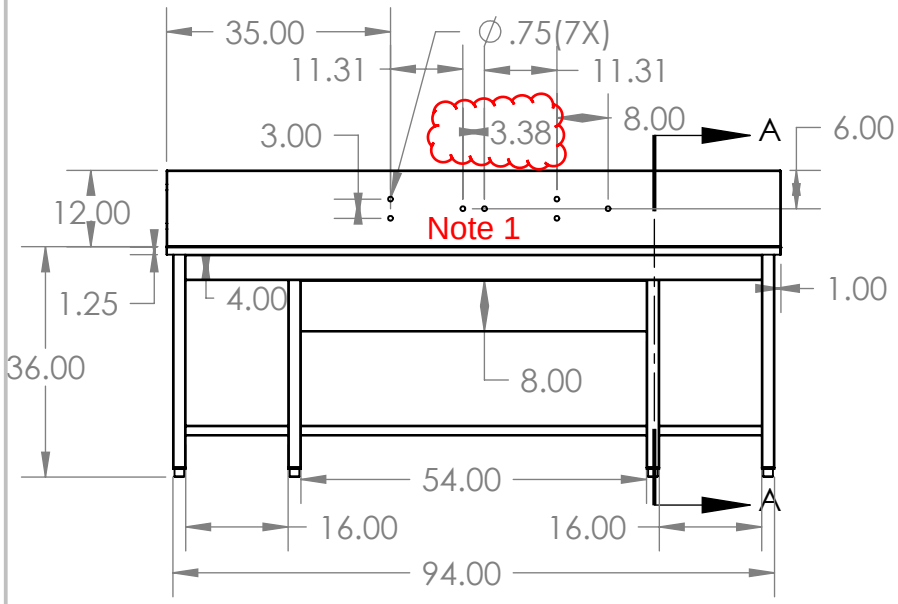
VERTICAL LEGS ARE 2" SQUARE STAINLESS TUBING
CROSS STRETCHERS ARE 1.5" SQUARE STAINLESS TUBING



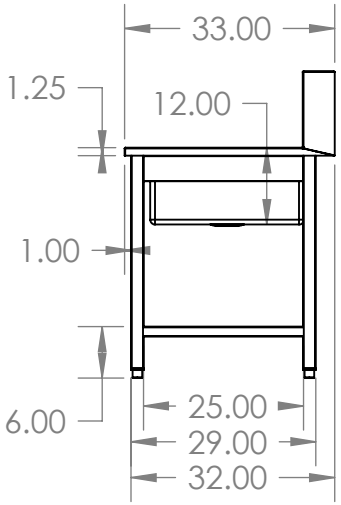
TOP PITCHED AND MARINE EDGE

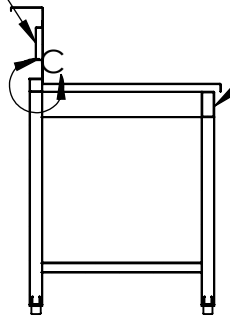


WELDED SHELF W/ CENTER STRETCHER



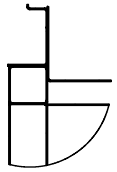
FAUCET STRETCHER W/ CLEARANCE HOLES FOR PLUMBING





SECTION A-A
SCALE 1 : 30

4" x 2" Stainless Tube



DETAIL C
SCALE 1 : 10

UNLESS OTHERWISE SPECIFIED:	REV.	REVISION DESCRIPTION	DRAWN	CHECKED	DATE	COMMENTS:
DIMENSIONS ARE IN INCHES TOLERANCES: ANGULAR ±2.50° ONE-PLACE ±0.5 TWO-PLACE ±0.13	A	STANDARD PRINT CREATED	ASR		11/11/20	HAT CHANNEL AND SOUND DEADENER TO BE APPLIED IN FINAL ASSEMBLY

QTY: N/A

INTER DYNE
SYSTEMS, INC
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